Kamke differential equations. Mathematica and Maple. Earlier version

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Contents

#1

$$y'(x) - \frac{1}{\sqrt{a_4x^4+a_3x^3+a_2x^2+a_1x+a_0}} = 0$$

Maple

```
restart;
ode1:=diff(y(x),x)-(a4*x^4+a3*x^3+a2*x^2+a1*x+a0)^(-1/2)=0;
dsolve(%,y(x));
```

$$y(x) = \int \frac{1}{\sqrt{a4\,x^4 + a3\,x^3 + a2\,x^2 + a1\,x + a0}}\,dx + \_C1$$

Mathematica

```
Remove["Global`*"]
ode1=y'[x]-1/Sqrt[(a4 x^4+a3 x^3+a2 x^2+a1 x+a0)]==0;
DSolve[ode1,y,x]
```

```
{{y[x] →
   C[1] - (2 EllipticF[ArcSin[√(((x - Root[a0 + a1 #1 + a2 #1^2 + a3 #1^3 + a4 #1^4 &, 1]) (Root[a0 +
                       a2 #1^2 + a3 #1^3 + a4 #1^4 &, 2] - Root[a0 + a1 #1 + a2 #1^2 + a3 #1^3 + a4 #1^4 &, 4]))
              ((x - Root[a0 + a1 #1 + a2 #1^2 + a3 #1^3 + a4 #1^4 &, 2]) (Root[a0 + a1 #1 + a2 #1^2 +
                       a3 #1^3 + a4 #1^4 &, 1] - Root[a0 + a1 #1 + a2 #1^2 + a3 #1^3 + a4 #1^4 &, 4]))))],
          ((Root[a0 + a1 #1 + a2 #1^2 + a3 #1^3 + a4 #1^4 &, 2] - Root[a0 + a1 #1 + a2 #1^2 + a3 #1^3 + a4 #1^4
             (Root[a0 + a1 #1 + a2 #1^2 + a3 #1^3 + a4 #1^4 &, 1] -
               Root[a0 + a1 #1 + a2 #1^2 + a3 #1^3 + a4 #1^4 &, 4])) /
           ((Root[a0 + a1 #1 + a2 #1^2 + a3 #1^3 + a4 #1^4 &, 1] - Root[a0 + a1 #1 + a2 #1^2 + a3 #1^3 + a4 #1
             (Root[a0 + a1 #1 + a2 #1^2 + a3 #1^3 + a4 #1^4 &, 2] - Root[a0 + a1 #1 + a2 #1^2 + a3 #1^3 + a4 #
                4]))] (x - Root[a0 + a1 #1 + a2 #1^2 + a3 #1^3 + a4 #1^4 &, 2])^2
        √(((Root[a0 + a1 #1 + a2 #1^2 + a3 #1^3 + a4 #1^4 &, 1] - Root[a0 + a1 #1 + a2 #1^2 + a3 #1^3 + a4 #1
              (x - Root[a0 + a1 #1 + a2 #1^2 + a3 #1^3 + a4 #1^4 &, 3])) /
            ((x - Root[a0 + a1 #1 + a2 #1^2 + a3 #1^3 + a4 #1^4 &, 2]) (Root[a0 + a1 #1 + a2 #1^2 +
                   a3 #1^3 + a4 #1^4 &, 1] - Root[a0 + a1 #1 + a2 #1^2 + a3 #1^3 + a4 #1^4 &, 3])))
        (Root[a0 + a1 #1 + a2 #1^2 + a3 #1^3 + a4 #1^4 &, 1] - Root[a0 + a1 #1 + a2 #1^2 + a3 #1^3 + a4 #1^4 &,
        √(((x - Root[a0 + a1 #1 + a2 #1^2 + a3 #1^3 + a4 #1^4 &, 1])
              (Root[a0 + a1 #1 + a2 #1^2 + a3 #1^3 + a4 #1^4 &, 1] - Root[a0 + a1 #1 + a2 #1^2 + a3 #1^3 + a4
                2]) (x - Root[a0 + a1 #1 + a2 #1^2 + a3 #1^3 + a4 #1^4 &, 4]) (Root[
                a0 + a1 #1 + a2 #1^2 + a3 #1^3 + a4 #1^4 &, 2] - Root[a0 + a1 #1 + a2 #1^2 + a3 #1^3 + a4 #1^4
            ((x - Root[a0 + a1 #1 + a2 #1^2 + a3 #1^3 + a4 #1^4 &, 2])^2 (Root[a0 + a1 #1 + a2 #1^2 +
                    a3 #1^3 + a4 #1^4 &, 1] - Root[a0 + a1 #1 + a2 #1^2 + a3 #1^3 + a4 #1^4 &, 4])^2))) /
      (√(a0 + x (a1 + x (a2 + x (a3 + a4 x)))) (-Root[a0 + a1 #1 + a2 #1^2 + a3 #1^3 + a4 #1^4 &, 1] +
          Root[a0 + a1 #1 + a2 #1^2 + a3 #1^3 + a4 #1^4 &, 2])
        (Root[a0 + a1 #1 + a2 #1^2 + a3 #1^3 + a4 #1^4 &, 2] - Root[a0 + a1 #1 + a2 #1^2 + a3 #1^3 + a4 #1^4 &,
```

#2

$y'(x) + ay(x) = ce^{bx}$

Maple

```
restart;
ode2:=diff(y(x),x)+a*y(x)=c*exp(b*x);
dsolve(%,y(x));
```

$$y(x) = \left(\frac{c\,e^{x\,(b\,+\,a)}}{b+a} + \_C1\right) e^{-a\,x}$$

Mathematica

```
Remove["Global`*"]
ode2=y'[x]+a y[x]-c Exp[b*x]==0
DSolve[%,y[x],x]// TraditionalForm
```

$$\left\{\left\{y(x) \to \frac{c\,e^{x\,(a+b)-a\,x}}{a+b} + c_1\,e^{-a\,x}\right\}\right\}$$

#3

$y'(x) + ay(x) - b\sin(cx) = 0$

Maple

```
restart;
ode3:=diff(y(x),x)+a*y(x)-b*sin(c*x)=0:
dsolve(%,y(x));
```

$$y(x) = e^{-a\,x}\,\_C1 + \frac{b\,(-\cos(c\,x)\;c + \sin(c\,x)\;a)}{a^2 + c^2}$$

Mathematica

```
Remove["Global`*"]
ode3=y'[x]+a y[x]-b Sin[c x]==0;
DSolve[%,y[x],x]// TraditionalForm
```

$$\left\{\left\{y(x) \to \frac{b\,(a\sin(c\,x) - c\cos(c\,x))}{a^2 + c^2} + c_1\,e^{-a\,x}\right\}\right\}$$

#4

$y'(x) + 2xy(x) - xe^{-x^2} = 0$

Maple

```
restart;
ode4:=diff(y(x),x)+2*x*y(x)-x*exp(-x^2)=0:
dsolve(%,y(x));
```

$$y(x) = \left(\frac{1}{2}x^2 + \_C1\right) e^{-x^2}$$

Mathematica

```
Remove["Global`*"]
ode4=y'[x]+2 x y[x]-x Exp[-x^2]==0;
DSolve[%,y[x],x]// TraditionalForm
```

$$\left\{\left\{y(x) \to c_1 e^{-x^2} + \frac{1}{2} e^{-x^2} x^2\right\}\right\}$$

#5

$y'(x) + y(x)\cos(x) - e^{2x} = 0$

Maple

```
restart;
ode5:=diff(y(x),x)+y(x)*cos(x)-exp(2*x)=0:
dsolve(%,y(x));
```

$$y(x) = e^{-\sin(x)} \left(\int e^{2x + \sin(x)}\, dx\right) + e^{-\sin(x)}\, \_C1$$

Mathematica

```
Remove["Global`*"]
ode5=y'[x]+y[x] Cos[x]-Exp[2*x]==0;
DSolve[%,y[x],x]// TraditionalForm
```

$$\left\{\left\{y(x) \to e^{-\sin(x)} \int_1^x e^{2K[1]+\sin(K[1])}\, dK[1] + c_1 e^{-\sin(x)}\right\}\right\}$$

#6

$y'(x)+y(x)\cos(x)-\frac{1}{2}\sin(2x)=0$

Maple

```
restart;
ode6:=diff(y(x),x)+y(x)*cos(x)-1/2*sin(2*x)=0:
dsolve(%,y(x));
```

$y(x) = \sin(x) - 1 + e^{-\sin(x)}\ \_C1$

Mathematica

```
Remove["Global`*"]
ode6=y'[x]+y[x] Cos[x]-1/2 Sin[2 x]==0;
DSolve[%,y[x],x]// TraditionalForm
```

$\{\{y(x)\to c_1\, e^{-\sin(x)}+\sin(x)-1\}\}$

#7

$y'(x)+y(x)\cos(x)-e^{-\sin(x)}=0$

Maple

```
restart;
ode7:=diff(y(x),x)+y(x)*cos(x)-exp(-sin(x))=0:
dsolve(%,y(x));
```

$y(x) = e^{-\sin(x)}\, x + e^{-\sin(x)}\ \_C1$

Mathematica

```
Remove["Global`*"]
ode7=y'[x]+y[x] Cos[x]-Exp[-Sin[x]]==0;
DSolve[%,y[x],x]// TraditionalForm
```

$\{\{y(x)\to c_1\, e^{-\sin(x)}+x\, e^{-\sin(x)}\}\}$

#8

$y'(x) + y(x)\tan(x) - \sin(2x) = 0$

Maple

```
restart;
ode8:=diff(y(x),x)+y(x)*tan(x)-sin(2*x)=0:
dsolve(%,y(x));
```

$y(x) = -2\cos(x)^2 + \cos(x)\ \_C1$

Mathematica

```
Remove["Global`*"]
ode8=y'[x]+y[x] Tan[x]-Sin[2 x]==0;
DSolve[%,y[x],x]// TraditionalForm
```

$\{\{y(x) \to c_1 \cos(x) - 2\cos^2(x)\}\}$

#9

$y'(x) - (\sin(\ln(x)) + \cos(\ln(x)) + a)\, y(x) = 0$

Maple

```
restart;
ode9:=diff(y(x),x)-(sin(log(x))+cos(log(x))+a)*y(x)=0:
dsolve(%,y(x));
```

$y(x) = \_C1\, e^{\sin(\ln(x))\, x + a\, x}$

Mathematica

```
Remove["Global`*"]
ode9=y'[x]-(Sin[Log[x]]+Cos[Log[x]]+a) y[x]==0;
DSolve[%,y[x],x]// TraditionalForm
```

$\{\{y(x) \to c_1\, e^{a\, x + x \sin(\log(x))}\}\}$

#10

$y'(x) + f'(x)\,y(x) - f(x)\,f'(x) = 0$

Maple

```
restart;
ode10:=diff(y(x),x)+diff(f(x),x)*y(x)=f(x)*diff(f(x),x);
dsolve(%,y(x));
```

$$ode10 := \frac{d}{dx}\,y(x) + \left(\frac{d}{dx}\,f(x)\right)y(x) = f(x)\left(\frac{d}{dx}\,f(x)\right)$$

$$y(x) = f(x) - 1 + e^{-f(x)}\,\_C1$$

Mathematica

```
Remove["Global`*"]
ode10=y'[x]+f'[x]*y[x]-f[x]*f'[x]==0;
DSolve[%,y[x],x]// TraditionalForm
```

$$\{\{y(x) \to c_1\,e^{-f(x)} + f(x) - 1\}\}$$

#11

$y'(x) + f(x)\,y(x) = g(x)$

Maple

```
restart;
ode11:=diff(y(x),x)+f(x)*y(x)=g(x);
dsolve(%,y(x));
```

$$y(x) = \left(\int g(x)\, e^{\int f(x)\, dx}\, dx + \_C1\right) e^{\int (-f(x))\, dx}$$

Mathematica

```
Remove["Global`*"]
ode11=y'[x]+f[x] y[x]==g[x];
First[DSolve[%,y[x],x]]// TraditionalForm
```

$$\left\{y(x) \to c_1\, e^{\int_1^x -f(K[1])\, dK[1]} + e^{\int_1^x -f(K[1])\, dK[1]} \int_1^x g(K[2])\, e^{-\int_1^{K[2]} -f(K[1])\, dK[1]}\, dK[2]\right\}$$

#12

$y'(x) + y(x)^2 = 1$

Maple

```
restart;
ode12:=diff(y(x),x)+(y(x))^2=1:
dsolve(%,y(x));
```

$y(x) = \tanh(x + \_C1)$

Mathematica

```
Remove["Global`*"]
ode12=y'[x]+y[x]^2==1;
DSolve[%,y[x],x]// TraditionalForm
ExpToTrig[%]//FullSimplify// TraditionalForm
```

$$\left\{\left\{y(x) \to \frac{e^{2x} - e^{2c_1}}{e^{2c_1} + e^{2x}}\right\}\right\}$$

$$\{\{y(x) \to \tanh(x - c_1)\}\}$$

#13

$y'(x) + y(x)^2 = ax + b$

Maple

```
restart;
ode13:=diff(y(x),x)+(y(x))^2=a*x+b:
dsolve(%,y(x));
```

$$y(x) = -\frac{I\,(-I\,a)^{1/3}\left(\_C1\ \mathrm{AiryAi}\left(1, -\frac{a\,x+b}{(-I\,a)^{2/3}}\right) + \mathrm{AiryBi}\left(1, -\frac{a\,x+b}{(-I\,a)^{2/3}}\right)\right)}{\_C1\ \mathrm{AiryAi}\left(-\frac{a\,x+b}{(-I\,a)^{2/3}}\right) + \mathrm{AiryBi}\left(-\frac{a\,x+b}{(-I\,a)^{2/3}}\right)}$$

Mathematica

```
Remove["Global`*"]
ode13=y'[x]+y[x]^2==a x+b;
DSolve[%,y[x],x]// TraditionalForm
```

$$\left\{\left\{y(x) \to -\frac{\sqrt[3]{a}\ c_1\ \mathrm{Ai}'\left(\frac{b+a\,x}{a^{2/3}}\right) + \sqrt[3]{a}\ \mathrm{Bi}'\left(\frac{b+a\,x}{a^{2/3}}\right)}{-c_1\ \mathrm{Ai}\left(\frac{b+a\,x}{a^{2/3}}\right) - \mathrm{Bi}\left(\frac{b+a\,x}{a^{2/3}}\right)}\right\}\right\}$$

#14

$y'(x) + y(x)^2 + ax^m = 0$

Maple

```
restart;
ode14:=diff(y(x),x)+(y(x))^2+a*x^m=0:
dsolve(%,y(x));
```

$$y(x) = \left(\_C1\,\mathrm{BesselJ}\left(\frac{1}{m+2}, \frac{2\sqrt{a}\,x^{\frac{1}{2}m+1}}{m+2}\right) - \_C1\,\mathrm{BesselJ}\left(\frac{3+m}{m+2}, \frac{2\sqrt{a}\,x^{\frac{1}{2}m+1}}{m+2}\right)\sqrt{a}\,x^{\frac{1}{2}m+1} + \mathrm{BesselY}\left(\frac{1}{m+2}, \frac{2\sqrt{a}\,x^{\frac{1}{2}m+1}}{m+2}\right) - \mathrm{BesselY}\left(\frac{3+m}{m+2}, \frac{2\sqrt{a}\,x^{\frac{1}{2}m+1}}{m+2}\right)\sqrt{a}\,x^{\frac{1}{2}m+1}\right) \Bigg/ \left(x\left(\_C1\,\mathrm{BesselJ}\left(\frac{1}{m+2}, \frac{2\sqrt{a}\,x^{\frac{1}{2}m+1}}{m+2}\right) + \mathrm{BesselY}\left(\frac{1}{m+2}, \frac{2\sqrt{a}\,x^{\frac{1}{2}m+1}}{m+2}\right)\right)\right)$$

=

Mathematica

```
Remove["Global`*"]
ode14=y'[x]+y[x]^2+a x^m==0;
DSolve[%,y[x],x]// TraditionalForm
```

$$\Bigg\{\Bigg\{y(x) \to -\left(i\sqrt{-a}\,x^{\frac{m+2}{2}}\left(c_1 J_{\frac{m+1}{m+2}}\left(\frac{2i\sqrt{-a}\,x^{\frac{m}{2}+1}}{m+2}\right) - c_1 J_{-\frac{m+3}{m+2}}\left(\frac{2i\sqrt{-a}\,x^{\frac{m+2}{2}}}{m+2}\right) - 2J_{\frac{1}{m+2}-1}\left(\frac{2i\sqrt{-a}\,x^{\frac{m+2}{2}}}{m+2}\right)\right) - c_1 J_{-\frac{1}{m+2}}\left(\frac{2i\sqrt{-a}\,x^{\frac{m+2}{2}}}{m+2}\right)\right) \Bigg/ \left(2x\left(c_1 J_{-\frac{1}{m+2}}\left(\frac{2i\sqrt{-a}\,x^{\frac{m+2}{2}}}{m+2}\right) + J_{\frac{1}{m+2}}\left(\frac{2i\sqrt{-a}\,x^{\frac{m+2}{2}}}{m+2}\right)\right)\right)\Bigg\}\Bigg\}$$

#15

$y'(x)+y(x)^2-2x^2y(x)+x^4-2x-1=0$

Maple

```
restart;
ode15:=diff(y(x),x)+(y(x))^2-2*x^2*y(x)+x^4-2*x-1=0:
dsolve(%,y(x));
```

$$y(x)=\frac{-\frac{\_C1}{\left(e^x\right)^2}-x^2+\frac{x^2\_C1}{\left(e^x\right)^2}-1}{-1+\frac{\_C1}{\left(e^x\right)^2}}$$

Mathematica

```
Remove["Global`*"]
ode15 = y'[x] + y[x]^2 - 2 x^2 y[x] + x^4 - 2 x - 1 == 0;
DSolve[%, y[x], x]// TraditionalForm
```

$$\left\{\left\{y(x)\to\frac{1}{c_1\left(-e^{2x}\right)-\frac{1}{2}}+x^2+1\right\}\right\}$$

#16

$$y'(x) + y(x)^2 - (xy(x) - 1)\, f(x) = 0$$

Maple

```
restart;
ode16:=diff(y(x),x)+y(x)^2- (x*y(x)-1)*f(x)=0:
dsolve(%,y(x));
```

$$y(x) = \frac{1}{x} - \frac{e^{\int \frac{-2+f(x)\,x^2}{x}\,dx}}{\_C1 - \left(\int e^{\int \frac{-2+f(x)\,x^2}{x}\,dx}\,dx\right)}$$

Mathematica

```
Remove["Global`*"]
ode16 = y'[x] + y[x]^2 + (x*y[x] - 1)*f[x] == 0;
DSolve[%, y[x], x]
```

InverseFunction::ifun : Inverse functions are being used. Values may be lost for multivalued inverses. ≫

InverseFunction::ifun : Inverse functions are being used. Values may be lost for multivalued inverses. ≫

```
DSolve[y[x]^2 + f[x] (-1 + x y[x]) + y'[x] == 0, y[x], x]
```

#17

$$y'(x) - y(x)^2 - 3y(x) + 4 = 0$$

Maple

```
restart;
ode16:=diff(y(x),x)-y(x)^2- 3*y(x)+4=0:
dsolve(%,y(x));
```

$$y(x) = -\frac{4\,e^{5\,x}\_C1 + 1}{-1 + e^{5\,x}\_C1}$$

Mathematica

```
Remove["Global`*"]
ode17 = y'[x] - y[x]^2 - 3*y[x] + 4 == 0;
DSolve[%, y[x], x]// TraditionalForm
```

$$\left\{\left\{y(x) \to \frac{-4\,e^{5\,c_1+5\,x} - 1}{e^{5\,c_1+5\,x} - 1}\right\}\right\}$$

#18

$y'(x) - y(x)^2 - xy(x) - x + 1 = 0$

Maple

```
restart;
ode18:=diff(y(x),x)-y(x)^2- x*y(x)-x+1=0:
dsolve(%,y(x));
```

$$y(x) = -1 + \frac{e^{\frac{1}{2}x^2 - 2x}}{\_C1 + \frac{1}{2} \mathrm{I} \sqrt{\pi}\, e^{-2} \sqrt{2}\, \mathrm{erf}\left(\frac{1}{2} \mathrm{I} \sqrt{2}\, x - \mathrm{I} \sqrt{2}\right)}$$

Mathematica

```
Remove["Global`*"]
ode18 = y'[x] - y[x]^2 - x*y[x] - x + 1 == 0;
DSolve[%, y[x], x]// TraditionalForm
```

$$\left\{\left\{y(x) \to \frac{e^{\frac{x^2}{2} - 2x}}{c_1 - \frac{\sqrt{\frac{\pi}{2}}\, \mathrm{erfi}\left(\frac{x-2}{\sqrt{2}}\right)}{e^2}} - 1\right\}\right\}$$

#19

$y'(x) - (y(x) + x)^2 = 0$

Maple

```
restart;
ode19:=diff(y(x),x)-(y(x)+x)^2=0:
dsolve(%,y(x));
```

$$y(x) = -x - \tan(-x + \_C1)$$

Mathematica

```
Remove["Global`*"]
ode19=y'[x]-(y[x]+x)^2==0;
DSolve[%,y[x],x]// TraditionalForm
```

$$\left\{\left\{y(x) \to \frac{1}{c_1 e^{2 i x} - \frac{i}{2}} - x - i\right\}\right\}$$

#20

$$y'(x) - y(x)^2 + (x^2+1)\,y(x) - 2x = 0$$

Maple

```
restart;
ode20:=diff(y(x),x)-y(x)^2+(x^2+1)*y(x)-2*x=0:
dsolve(%,y(x));
```

$$y(x) = x^2 + 1 + \frac{e^{\frac{1}{3}x^3 + x}}{\_C1 - \left(\int e^{\frac{1}{3}x^3 + x}\, dx\right)}$$

Mathematica

```
Remove["Global`*"]
ode20=y'[x]-y[x]^2+(x^2+1)*y[x]-2*x==0;
DSolve[%,y[x],x]// TraditionalForm
```

$$\left\{\left\{y(x) \to \frac{e^{\frac{x^3}{3}+x}}{c_1 - \int_1^x e^{\frac{K[1]^3}{3}+K[1]}\, dK[1]} + x^2 + 1\right\}\right\}$$

#21

$$y'(x) - y(x)^2 + y(x)\sin(x) - \cos(x) = 0$$

Maple

```
restart;
ode21:=diff(y(x),x)-y(x)^2+y(x)*sin(x)-cos(x)=0:
dsolve(%,y(x));
```

$$y(x) = -\frac{e^{-\cos(x)}}{\_C1 + \int e^{-\cos(x)}\,dx} + \sin(x)$$

Mathematica

```
Remove["Global`*"]
ode21=y'[x]-y[x]^2+y[x]*Sin[x]-Cos[x]==0;
DSolve[%,y[x],x]// TraditionalForm
```

$$\{\{y(x) \to \sin(x)\}\}$$

#22

$$y'(x) - y(x)^2 - y(x)\sin(2x) - \cos(2x) = 0$$

Maple

```
restart;
ode22:=diff(y(x),x)-sin(2*x)*y(x)-y(x)^2=0;
dsolve(%,y(x));
```

$$y(x) = \frac{e^{-\cos(x)^2}}{\int \left(-e^{-\cos(x)^2}\right) dx + \_C1}$$

Mathematica

```
Remove["Global`*"]
ode22=y'[x]-y[x]^2-y[x]*Sin[2*x]-Cos[2*x]==0
DSolve[%,y[x],x]
```

Solve::ifun : Inverse functions are being used by Solve, so some solutions may not be found; use Reduce for complete solution information. ≫

```
DSolve[-Cos[2 x] - Sin[2 x] y[x] - y[x]^2 + y'[x] == 0, y[x], x]
```

#23

$y'(x)+ay(x)^2-b=0$

Maple

```
restart;
ode23:=diff(y(x),x)+a*y(x)^2-b=0:
dsolve(%,y(x));
```

$$y(x)=\frac{\tanh\left(x\sqrt{b\,a}+\_C1\sqrt{b\,a}\right)\sqrt{b\,a}}{a}$$

Mathematica

```
Remove["Global`*"]
ode23=y'[x]+a*y[x]^2-b==0;
DSolve[%,y[x],x]// TraditionalForm
```

$$\left\{\left\{y(x)\to\frac{\sqrt{b}\tanh\left(\sqrt{a}\sqrt{b}\,c_1+\sqrt{a}\sqrt{b}\,x\right)}{\sqrt{a}}\right\}\right\}$$

#24

$y'(x)+ay(x)^2-bx^\nu=0$

Maple

```
restart;
ode24:=diff(y(x),x)+a*y(x)^2-b*x^nu=0:
dsolve(%,y(x));
```

$$y(x)=\Bigg(\_C1\,\mathrm{BesselJ}\left(\frac{1}{\nu+2},\frac{2\sqrt{-a\,b}\,x^{\frac{1}{2}\nu+1}}{\nu+2}\right)-\_C1\,\mathrm{BesselJ}\left(\frac{3+\nu}{\nu+2},\frac{2\sqrt{-a\,b}\,x^{\frac{1}{2}\nu+1}}{\nu+2}\right)\sqrt{-a\,b}\,x^{\frac{1}{2}\nu+1}+\mathrm{BesselY}\left(\frac{1}{\nu+2},\frac{2\sqrt{-a\,b}\,x^{\frac{1}{2}\nu+1}}{\nu+2}\right)-\mathrm{BesselY}\left(\frac{3+\nu}{\nu+2},\frac{2\sqrt{-a\,b}\,x^{\frac{1}{2}\nu+1}}{\nu+2}\right)\sqrt{-a\,b}\,x^{\frac{1}{2}\nu+1}\Bigg)\Bigg/\Bigg(x\,a\left(\_C1\,\mathrm{BesselJ}\left(\frac{1}{\nu+2},\frac{2\sqrt{-a\,b}\,x^{\frac{1}{2}\nu+1}}{\nu+2}\right)+\mathrm{BesselY}\left(\frac{1}{\nu+2},\frac{2\sqrt{-a\,b}\,x^{\frac{1}{2}\nu+1}}{\nu+2}\right)\right)\Bigg)$$

Mathematica

```
Remove["Global`*"]
ode24=y'[x]+a*y[x]^2-b*x^nu==0;
DSolve[%,y[x],x]//TraditionalForm
```

$$\left\{\left\{y(x)\to-\left(\sqrt{-a}\,\sqrt{b}\,x^{\frac{nu+2}{2}}\left(c_1\,J_{\frac{nu+1}{nu+2}}\left(\frac{2\sqrt{-a}\,\sqrt{b}\,x^{\frac{nu}{2}+1}}{nu+2}\right)-c_1\,J_{-\frac{nu+3}{nu+2}}\left(\frac{2\sqrt{-a}\,\sqrt{b}\,x^{\frac{nu+2}{2}}}{nu+2}\right)-2\,J_{\frac{1}{nu+2}-1}\left(\frac{2\sqrt{-a}\,\sqrt{b}\,x^{\frac{nu+2}{2}}}{nu+2}\right)\right)-c_1\,J_{-\frac{1}{nu+2}}\left(\frac{2\sqrt{-a}\,\sqrt{b}\,x^{\frac{nu+2}{2}}}{nu+2}\right)\right)\Bigg/\left(2\,a\,x\left(c_1\,J_{-\frac{1}{nu+2}}\left(\frac{2\sqrt{-a}\,\sqrt{b}\,x^{\frac{nu+2}{2}}}{nu+2}\right)+J_{\frac{1}{nu+2}}\left(\frac{2\sqrt{-a}\,\sqrt{b}\,x^{\frac{nu+2}{2}}}{nu+2}\right)\right)\right)\right\}\right\}$$

#25

$$y'(x) + ay(x)^2 - bx^{2\nu} - cx^{\nu-1} = 0$$

Maple

```
restart;
ode25:=diff(y(x),x)+a*y(x)^2-b*x^(2*nu)-c*x^(nu-1)=0:
dsolve(%,y(x));
```

$$y(x) = \frac{1}{2}\left(\left(-\_C1\, b^{3/2}\nu + 2\,\_C1\, b^2\sqrt{a}\, x^{1+\nu} + \_C1\, b\sqrt{a}\, c\right)\mathrm{WhittakerW}\left(-\frac{1}{2}\frac{\sqrt{a}\, c}{\sqrt{b}\,(1+\nu)}, \frac{1}{2\,(1+\nu)}, \frac{2\sqrt{a}\sqrt{b}\, x^{1+\nu}}{1+\nu}\right) + \left(-2\,\_C1\, b^{3/2} - 2\,\_C1\, b^{3/2}\nu\right)\mathrm{WhittakerW}\left(-\frac{1}{2}\frac{\sqrt{a}\, c - 2\sqrt{b} - 2\sqrt{b}\,\nu}{\sqrt{b}\,(1+\nu)}, \frac{1}{2\,(1+\nu)}, \frac{2\sqrt{a}\sqrt{b}\, x^{1+\nu}}{1+\nu}\right) + \left(-\nu\, b^{3/2} + 2\, b^2\sqrt{a}\, x^{1+\nu} + b\sqrt{a}\, c\right)\mathrm{WhittakerM}\left(-\frac{1}{2}\frac{\sqrt{a}\, c}{\sqrt{b}\,(1+\nu)}, \frac{1}{2\,(1+\nu)}, \frac{2\sqrt{a}\sqrt{b}\, x^{1+\nu}}{1+\nu}\right) + \left(2\, b^{3/2} + \nu\, b^{3/2} - b\sqrt{a}\, c\right)\mathrm{WhittakerM}\left(-\frac{1}{2}\frac{\sqrt{a}\, c - 2\sqrt{b} - 2\sqrt{b}\,\nu}{\sqrt{b}\,(1+\nu)}, \frac{1}{2\,(1+\nu)}, \frac{2\sqrt{a}\sqrt{b}\, x^{1+\nu}}{1+\nu}\right)\right) \Bigg/ \left(b^{3/2}\left(\_C1\,\mathrm{WhittakerW}\left(-\frac{1}{2}\frac{\sqrt{a}\, c}{\sqrt{b}\,(1+\nu)}, \frac{1}{2\,(1+\nu)}, \frac{2\sqrt{a}\sqrt{b}\, x^{1+\nu}}{1+\nu}\right) + \mathrm{WhittakerM}\left(-\frac{1}{2}\frac{\sqrt{a}\, c}{\sqrt{b}\,(1+\nu)}, \frac{1}{2\,(1+\nu)}, \frac{2\sqrt{a}\sqrt{b}\, x^{1+\nu}}{1+\nu}\right)\right) a\, x\right)$$

Mathematica

```
Remove["Global`*"]
ode25=y'[x]+a*y[x]^2-b*x^(2*\[Nu])-c*x^(\[Nu]-1)==0
DSolve[%,y[x],x]// Simplify // TraditionalForm
```

$$\Bigg\{\Bigg\{y(x) \to -\Bigg(x^\nu \Bigg(\sqrt{b}\, c_1 (\nu+1)\sqrt{(\nu+1)^2}\; U\left(\frac{\sqrt{b}\sqrt{(\nu+1)^2}\,\nu + \sqrt{a}\, c(\nu+1)}{2\sqrt{b}\,(\nu+1)\sqrt{(\nu+1)^2}}, \frac{\nu}{\nu+1}, \frac{2\sqrt{a}\sqrt{b}\, x^{\nu+1}}{\sqrt{(\nu+1)^2}}\right) + c_1\left(\sqrt{a}\, c(\nu+1) + \sqrt{b}\sqrt{(\nu+1)^2}\,\nu\right) U\left(\frac{\sqrt{a}\, c(\nu+1) + \sqrt{b}\sqrt{(\nu+1)^2}\,(3\nu+2)}{2\sqrt{b}\,(\nu+1)\sqrt{(\nu+1)^2}}, \frac{\nu}{\nu+1}+1, \frac{2\sqrt{a}\sqrt{b}\, x^{\nu+1}}{\sqrt{(\nu+1)^2}}\right) + \sqrt{b}\,(\nu+1)\sqrt{(\nu+1)^2}\left(L^{-\frac{1}{\nu+1}}_{\frac{-\sqrt{a}\, c(\nu+1) - \sqrt{b}\sqrt{(\nu+1)^2}\,\nu}{2\sqrt{b}\,(\nu+1)\sqrt{(\nu+1)^2}}}\left(\frac{2\sqrt{a}\sqrt{b}\, x^{\nu+1}}{\sqrt{(\nu+1)^2}}\right) + 2\, L^{\frac{\nu}{\nu+1}}_{\frac{-\sqrt{a}\, c(\nu+1) - \sqrt{b}\sqrt{(\nu+1)^2}\,(3\nu+2)}{2\sqrt{b}\,(\nu+1)\sqrt{(\nu+1)^2}}}\left(\frac{2\sqrt{a}\sqrt{b}\, x^{\nu+1}}{\sqrt{(\nu+1)^2}}\right)\right)\Bigg)\Bigg) \Bigg/$$

#26

$y'(x) - (Ay(x) - a)(By(x) - b) = 0$

Maple

```
restart;
ode26:=diff(y(x),x)-(A*y(x)-a)*(B*y(x)-b)=0:
dsolve(%,y(x));
```

$$y(x) = \frac{e^{x A b - x a B + \_C1 A b - \_C1 a B} a - b}{e^{x A b - x a B + \_C1 A b - \_C1 a B} A - B}$$

Mathematica

```
Remove["Global`*"]
ode26=y'[x]-(A*y[x]-a)*(B*y[x]-b)==0;
DSolve[%,y[x],x]//TraditionalForm
```

$$\left\{\left\{y(x) \to \frac{a\, e^{A b c_1 + A b x} - b\, e^{a B c_1 + a B x}}{A\, e^{A b c_1 + A b x} - B\, e^{a B c_1 + a B x}}\right\}\right\}$$

#27

$y'(x) + ay(x)(y(x) - x) - 1 = 0$

Maple

```
restart;
ode27:=diff(y(x),x)+a*y(x)*(y(x)-x)-1=0:
dsolve(%,y(x));
```

$$y(x) = \frac{a x \sqrt{\pi}\sqrt{2}\,\mathrm{erf}\left(\frac{1}{2}\sqrt{2}\sqrt{a}\,x\right) + 2 a^{3/2} x \_C1 + 2\sqrt{a}\,\mathrm{e}^{-\frac{1}{2} a x^2}}{a\sqrt{\pi}\sqrt{2}\,\mathrm{erf}\left(\frac{1}{2}\sqrt{2}\sqrt{a}\,x\right) + 2 a^{3/2} \_C1}$$

Mathematica

```
Remove["Global`*"]
ode27=y'[x]+a*y[x]*(y[x]-x)-1==0;
DSolve[%,y[x],x]//TraditionalForm
```

$$\left\{\left\{y(x) \to \frac{c_1\left(\sqrt{\frac{\pi}{2}}\sqrt{a}\,x\,e^{\frac{a x^2}{2}}\,\mathrm{erf}\left(\frac{\sqrt{a}\,x}{\sqrt{2}}\right) + 1\right) + a\,x\,e^{\frac{a x^2}{2}}}{a\left(\frac{\sqrt{\frac{\pi}{2}}\,c_1\,e^{\frac{a x^2}{2}}\,\mathrm{erf}\left(\frac{\sqrt{a}\,x}{\sqrt{2}}\right)}{\sqrt{a}} + e^{\frac{a x^2}{2}}\right)}\right\}\right\}$$

#28

$y'(x) + xy(x)^2 - x^3y(x) - 2x = 0$

Maple

```
restart;
ode28:=diff(y(x),x)+x*y(x)^2-x^3*y(x)-2*x=0;
dsolve(%,y(x));
```

$$y(x) = \frac{2\_C1\, e^{-\frac{1}{4}x^4}}{\sqrt{\pi}\left(\_C1\, \mathrm{erf}\left(\frac{1}{2}x^2\right)+1\right)} + \frac{x^2\sqrt{\pi} + \_C1\, x^2\, \mathrm{erf}\left(\frac{1}{2}x^2\right)\sqrt{\pi}}{\sqrt{\pi}\left(\_C1\, \mathrm{erf}\left(\frac{1}{2}x^2\right)+1\right)}$$

Mathematica

```
Remove["Global`*"]
ode28=y'[x]+x*y[x]^2-x^3*y[x]-2*x==0;
DSolve[%,y[x],x]//TraditionalForm
```

$$\left\{\left\{y(x) \to \frac{c_1 e^{\frac{x^4}{4}} x^3 + \frac{1}{2}\sqrt{\pi}\, e^{\frac{x^4}{4}} x^3\, \mathrm{erf}\left(\frac{x^2}{2}\right) + x}{x\left(c_1 e^{\frac{x^4}{4}} + \frac{1}{2}\sqrt{\pi}\, e^{\frac{x^4}{4}}\, \mathrm{erf}\left(\frac{x^2}{2}\right)\right)}\right\}\right\}$$

#29

$y'(x) - xy(x)^2 - 3xy(x) = 0$

Maple

```
restart;
ode29:=diff(y(x),x)-x*y(x)^2-3*x*y(x)=0:
dsolve(%,y(x));
```

$$y(x) = \frac{3}{-1 + 3\,e^{-\frac{3}{2}x^2}\,\_C1}$$

Mathematica

```
Remove["Global`*"]
ode29=y'[x]-x*y[x]^2-3*x*y[x]==0;
DSolve[%,y[x],x]//TraditionalForm
```

$$\left\{\left\{y(x) \to -\frac{3\,e^{3 c_1 + \frac{3x^2}{2}}}{e^{3 c_1 + \frac{3x^2}{2}} - 1}\right\}\right\}$$

#30

$$y'(x) + x^{(-1-a)}y(x)^2 - x^a = 0$$

Maple

```
restart;
ode30:=diff(y(x),x)+x^(-1-a)*y(x)^2-x^a=0:
dsolve(%,y(x));
```

$$y(x) = -\frac{\_C1\, x^{1+a}\,\mathrm{BesselK}(1+a, 2\sqrt{x})}{\sqrt{x}\,(\_C1\,\mathrm{BesselK}(a, 2\sqrt{x}) + \mathrm{BesselI}(a, 2\sqrt{x}))} + \frac{\mathrm{BesselI}(1+a, 2\sqrt{x})\, x^{1+a}}{\sqrt{x}\,(\_C1\,\mathrm{BesselK}(a, 2\sqrt{x}) + \mathrm{BesselI}(a, 2\sqrt{x}))}$$

Mathematica

```
Remove["Global`*"]
ode30=y'[x]+x^(-a-1)*y[x]^2-x^a==0
DSolve[%,y[x],x]
```

$$\Big\{\Big\{y[x] \to \Big(x^{1+a}\Big(\frac{1}{2}(-1)^{-a}x^{-\frac{1}{2}-\frac{a}{2}}\big(\mathrm{BesselI}[-1-a, 2\sqrt{x}] + \mathrm{BesselI}[1-a, 2\sqrt{x}]\big)\mathrm{Gamma}[1-a] - \frac{1}{2}(-1)^{-a}\,a\,x^{-1-\frac{a}{2}}\mathrm{BesselI}[-a, 2\sqrt{x}]\,\mathrm{Gamma}[1-a] + C[1]\Big(-\frac{1}{2}\,a\,x^{-1-\frac{a}{2}}\mathrm{BesselI}[a, 2\sqrt{x}]\,\mathrm{Gamma}[1+a] + \frac{1}{2}x^{-\frac{1}{2}-\frac{a}{2}}\big(\mathrm{BesselI}[-1+a, 2\sqrt{x}] + \mathrm{BesselI}[1+a, 2\sqrt{x}]\big)\mathrm{Gamma}[1+a]\Big)\Big)\Big) \Big/ \Big((-1)^{-a}x^{-a/2}\mathrm{BesselI}[-a, 2\sqrt{x}]\,\mathrm{Gamma}[1-a] + x^{-a/2}\mathrm{BesselI}[a, 2\sqrt{x}]\,C[1]\,\mathrm{Gamma}[1+a]\Big)\Big\}\Big\}$$

#31

$$y'(x) - ax^n\left(y(x)^2 + 1\right) = 0$$

Maple

```
restart;
ode31:=diff(y(x),x)-a*x^n*(y(x)^2+1)=0:
dsolve(%,y(x));
```

$$y(x) = \tan\left(\frac{a\,x^{n+1} + \_C1\,a\,n + \_C1\,a}{n+1}\right)$$

Mathematica

```
Remove["Global`*"]
ode31 = y'[x] - a*x^n*(y[x]^2 + 1) == 0;
DSolve[%, y[x], x] // TraditionalForm
```

$$\left\{\left\{y(x) \to \tan\left(\frac{a\,x^{n+1}}{n+1} + c_1\right)\right\}\right\}$$

#32

$$y'(x) + y(x)^2 \sin(x) - 2\frac{\sin(x)}{\cos(x)^2} = 0$$

Maple

```
restart;
ode31:=diff(y(x),x)+y(x)^2*sin(x)-2*sin(x)/cos(x)^2=0:
dsolve(%,y(x));
```

$$y(x) = -\frac{2\left(\cos(x)^3\,\_C1 + 1\right)}{\left(\cos(x)^3\,\_C1 - 2\right)\cos(x)}$$

Mathematica

```
Remove["Global`*"]
ode32=y'[x]+y[x]^2*Sin[x]-2*Sin[x]/Cos[x]^2==0;
DSolve[%,y[x],x]//TraditionalForm
```

$$\left\{\left\{y(x) \to \frac{\csc(x)\,(c_1 \tan(x)\sec(x) - 2\sin(x)\cos(x))}{c_1 \sec(x) + \cos^2(x)}\right\}\right\}$$

#33

$$y'(x) - \frac{y(x)^2 f'(x)}{g(x)} + \frac{g'(x)}{f(x)} = 0$$

Maple

```
restart;
ode33:=diff(y(x),x)-y(x)^2*diff(f(x),x)/g(x)+diff(g(x),x)/f(x)=0;
dsolve(%,y(x));
```

$$ode33 := \frac{d}{dx} y(x) - \frac{y(x)^2 \left(\frac{d}{dx} f(x)\right)}{g(x)} + \frac{\frac{d}{dx} g(x)}{f(x)} = 0$$

$$y(x) = -\frac{1 + \left(\int \frac{\frac{d}{dx} f(x)}{f(x)^2 g(x)}\, dx\right) f(x)\, g(x) + \_C1\, f(x)\, g(x)}{f(x)^2 \left(\int \frac{\frac{d}{dx} f(x)}{f(x)^2 g(x)}\, dx + \_C1\right)}$$

Mathematica

```
Remove["Global`*"]
(ode33=y'[x]-y[x]^2*D[f[x],x]/g[x]+D[g[x],x]/f[x]==0)//TraditionalForm
DSolve[ode33,y[x],x]//TraditionalForm
```

$$\text{Solve}\Bigg[\int_1^{y(x)}\Bigg(\frac{1}{(f(x)\,K[2]+g(x))^2} - \int_1^x\Bigg(\frac{2\left(K[2]^2\, f(K[1])\, f'(K[1]) - g(K[1])\, g'(K[1])\right)}{g(K[1])\,(K[2]\, f(K[1]) + g(K[1]))^3} - \frac{2\, K[2]\, f'(K[1])}{g(K[1])\,(K[2]\, f(K[1]) + g(K[1]))^2}\Bigg) dK[1]\Bigg) dK[2] + \int_1^x -\frac{y(x)^2\, f(K[1])\, f'(K[1]) - g(K[1])\, g'(K[1])}{f(K[1])\, g(K[1])\,(y(x)\, f(K[1]) + g(K[1]))^2}\, dK[1] = c_1,\ y(x)\Bigg]$$

#34

$y'(x) + f(x)\,y(x)^2 + g(x)\,y(x) = 0$

Maple

```
restart;
ode34:=diff(y(x),x)+f(x)*y(x)^2+g(x)*y(x)=0:
dsolve(%,y(x));
```

$$y(x) = \frac{e^{\int (-g(x))\,dx}}{\int e^{\int (-g(x))\,dx} f(x)\,dx + \_C1}$$

Mathematica

```
Remove["Global`*"]
ode34=y'[x]+f[x]*y[x]^2+g[x]*y[x]==0
DSolve[%,y[x],x]//TraditionalForm
```

$$\left\{\left\{y(x) \to \frac{e^{\int_1^x -g(K[1])\,dK[1]}}{c_1 - \int_1^x f(K[2])\left(-e^{\int_1^{K[2]} -g(K[1])\,dK[1]}\right)dK[2]}\right\}\right\}$$

#35

$$y'(x)+f(x)\left(y(x)^2+2ay(x)+b\right)=0$$

Maple

```
restart;
ode35:=diff(y(x),x)+f(x)*(y(x)^2+2*a*y(x)+b)=0:
dsolve(%,y(x));
```

$$y(x) = -a + \tanh\left(\left(\int f(x)\,\mathrm{d}x\right)\sqrt{-b+a^2} + \_C1\sqrt{-b+a^2}\right)\sqrt{-b+a^2}$$

Mathematica

```
Remove["Global`*"]
ode35 = y'[x] + f[x]*(y[x]^2 + 2*a*y[x] + b) == 0;
DSolve[%, y[x], x] // TraditionalForm
```

$$\left\{\left\{y(x)\to\sqrt{b-a^2}\,\tan\left(\sqrt{b-a^2}\int_1^x -f(K[1])\,dK[1]+c_1\sqrt{b-a^2}\right)-a\right\}\right\}$$

#36

$y'(x) + y(x)^3 + axy(x)^2 = 0$

Maple

```
restart;
ode36:=diff(y(x),x)+y(x)^3+a*x*y(x)^2=0:
dsolve(%,y(x));
```

$$y(x) = (2\,a) \Big/ \Big(2\,RootOf\big(\_C1\,(-2\,a^2)^{1/3}\,x\,\mathrm{AiryBi}(\_Z) + 2\,\_C1\,\mathrm{AiryBi}(1,\_Z) + (-2\,a^2)^{1/3}\,x\,\mathrm{AiryAi}(\_Z) + 2\,\mathrm{AiryAi}(1,\_Z)\big)\,(-2\,a^2)^{1/3} + a^2\,x^2\Big)$$

Mathematica

```
Remove["Global`*"]
ode36 = y'[x] + y[x]^3 + a*x*y[x]^2 == 0
DSolve[%, y[x], x] // TraditionalForm
```

$$\mathrm{Solve}\left[\frac{\mathrm{Ai}'\left(\frac{\sqrt[3]{-\frac{1}{2}}\,\sqrt[3]{a}}{y(x)} - \frac{1}{2}\sqrt[3]{-\frac{1}{2}}\,a^{4/3}\,x^2\right) - \left(-\frac{1}{2}\right)^{2/3} a^{2/3}\,x\,\mathrm{Ai}\left(\frac{\sqrt[3]{-\frac{1}{2}}\,\sqrt[3]{a}}{y(x)} - \frac{1}{2}\sqrt[3]{-\frac{1}{2}}\,a^{4/3}\,x^2\right)}{\mathrm{Bi}'\left(\frac{\sqrt[3]{-\frac{1}{2}}\,\sqrt[3]{a}}{y(x)} - \frac{1}{2}\sqrt[3]{-\frac{1}{2}}\,a^{4/3}\,x^2\right) - \left(-\frac{1}{2}\right)^{2/3} a^{2/3}\,x\,\mathrm{Bi}\left(\frac{\sqrt[3]{-\frac{1}{2}}\,\sqrt[3]{a}}{y(x)} - \frac{1}{2}\sqrt[3]{-\frac{1}{2}}\,a^{4/3}\,x^2\right)} + c_1 = 0,\ y(x)\right]$$

#37

$y'(x) - y(x)^3 - ae^x y(x)^2 = 0$

Maple

```
restart;
ode37:=diff(y(x),x)-y(x)^3-a*exp(x)*y(x)^2=0:
dsolve(%,y(x));
```

$$\_C1 + \frac{e^{-\frac{1}{2}\left(a\,e^x + \frac{1}{y(x)}\right)^2}}{a\,e^x} + \frac{1}{2}\operatorname{erf}\left(\frac{1}{2}\left(a\,e^x + \frac{1}{y(x)}\right)\sqrt{2}\right)\sqrt{2}\,\sqrt{\pi} = 0$$

Mathematica

```
Remove["Global`*"]
ode37 = y'[x] - y[x]^3 - a*Exp[x]*y[x]^2 == 0
DSolve[%, y[x], x] // TraditionalForm
```

$$\text{Solve}\left[-i\,a\,e^x = \frac{2\,e^{\frac{1}{2}\left(-i\,a\,e^x - \frac{i}{y(x)}\right)^2}}{2\,c_1 + \sqrt{2\,\pi}\,\operatorname{erfi}\left(\frac{-i\,a\,e^x - \frac{i}{y(x)}}{\sqrt{2}}\right)},\, y(x)\right]$$

#38

$$y'(x) - ay(x)^3 - bx^{\frac{3}{2}} = 0$$

Maple

```
restart;
ode38:=diff(y(x),x)-a*y(x)^3-b*x^(3/2)=0:
dsolve(%,y(x));
```

Nothing returned

Mathematica

```
Remove["Global`*"]
ode38 = y'[x] - a*y[x]^3 - b*x^(3/2) == 0
DSolve[%, y[x], x] // TraditionalForm
```

$$\text{DSolve}\left[-a\, y(x)^3 - b\, x^{3/2} + y'(x) = 0,\ y(x),\ x\right]$$

#39

$$y'(x) - a_3 y(x)^3 - a_2 y(x)^2 - a_1 y(x) - a_0 = 0$$

Maple

```
restart;
ode39:=diff(y(x),x)-a3*y(x)^3-a2*y(x)^2-a1*y(x)-a0=0:
dsolve(%,y(x));
```

$$x - \left(\int^{y(x)} \frac{1}{a3\,\_a^3 + a2\,\_a^2 + a1\,\_a + a0} \, d\_a \right) + \_C1 = 0$$

Mathematica

```
Remove["Global`*"]
ode39 = y'[x] - a3*y[x]^3 - a2*y[x]^2 - a1*y[x] - a0 == 0
DSolve[%, y[x], x] // TraditionalForm
```

$$\text{Solve}\left[\text{RootSum}\left[\#1^3\,\text{a3} + \#1^2\,\text{a2} + \#1\,\text{a1} + \text{a0}\,\&, \frac{\log(y(x) - \#1)}{3\,\#1^2\,\text{a3} + 2\,\#1\,\text{a2} + \text{a1}}\,\&\right] = c_1 + x,\; y(x)\right]$$

#40

$y'(x) + 3ay(x)^3 + 6axy(x)^2 = 0$

Maple

```
restart;
ode40:=diff(y(x),x)+3*a*y(x)^3+6*a*x*y(x)^2=0:
dsolve(%,y(x));
```

$$y(x) = 1 \Big/ \left(\mathit{RootOf}\left(\_C1\,(-3\,a)^{1/3}\,x\,\mathrm{AiryBi}(\_Z) + \_C1\,\mathrm{AiryBi}(1,\_Z) + (-3\,a)^{1/3}\,x\,\mathrm{AiryAi}(\_Z) + \mathrm{AiryAi}(1,\_Z)\right)(-3\,a)^{1/3} + 3\,x^2\,a \right)$$

Mathematica

```
Remove["Global`*"]
ode40 = y'[x] + 3*a*y[x]^3 + 6*a*x*y[x]^2 == 0
DSolve[%, y[x], x] // TraditionalForm
```

$$\mathrm{Solve}\left[\frac{\sqrt[3]{-3}\,\sqrt[3]{a}\,x\,\mathrm{Ai}\left((-3)^{2/3}\,a^{2/3}\,x^2 - \frac{(-1)^{2/3}}{\sqrt[3]{3}\,\sqrt[3]{a}\,y(x)}\right) + \mathrm{Ai}'\left((-3)^{2/3}\,a^{2/3}\,x^2 - \frac{(-1)^{2/3}}{\sqrt[3]{3}\,\sqrt[3]{a}\,y(x)}\right)}{\sqrt[3]{-3}\,\sqrt[3]{a}\,x\,\mathrm{Bi}\left((-3)^{2/3}\,a^{2/3}\,x^2 - \frac{(-1)^{2/3}}{\sqrt[3]{3}\,\sqrt[3]{a}\,y(x)}\right) + \mathrm{Bi}'\left((-3)^{2/3}\,a^{2/3}\,x^2 - \frac{(-1)^{2/3}}{\sqrt[3]{3}\,\sqrt[3]{a}\,y(x)}\right)} + c_1 = 0,\ y(x)\right]$$

#41

$y'(x) + axy(x)^3 + by(x)^2 = 0$

Maple

```
restart;
ode41:=diff(y(x),x)+a*x*y(x)^3+b*y(x)^2=0:
dsolve(%,y(x));
```

$$y(x) = 1 \Big/ xe^{RootOf\left(8\_Za + 2\_Zb^2 + 8\_C1\,a + 2\_C1\,b^2 + 2\sqrt{4a+b^2}\,b\,\mathrm{arctanh}\left(\frac{2a\,e^{\_Z} + b}{\sqrt{4a+b^2}}\right) - 4\ln\left(x^2\left(-1 + a\,e^{2\_Z} + e^{\_Z}b\right)\right)a - \ln\left(x^2\left(-1 + a\,e^{2\_Z} + e^{\_Z}b\right)\right)b^2\right)}$$

Mathematica

```
Remove["Global`*"]
ode41 = y'[x] + a*x*y[x]^3 + b*y[x]^2 == 0
DSolve[%, y[x], x] // TraditionalForm
```

$$\mathrm{Solve}\left[-\frac{b^2\left(\frac{2\tan^{-1}\left(\frac{-2axy(x)-b}{b\sqrt{-\frac{4a}{b^2}-1}}\right)}{\sqrt{-\frac{4a}{b^2}-1}} - \log\left(\frac{a(-x)y(x)(-axy(x)-b)-a}{a^2x^2y(x)^2}\right)\right)}{2a} = c_1 - \frac{b^2\log(x)}{a},\ y(x)\right]$$

#42

$$y'(x) - x(x+2)\,y(x)^3 - (x+3)\,y(x)^2 = 0$$

Maple

```
restart;
ode42:=diff(y(x),x)-x*(x+2)*y(x)^3-(x+3)*y(x)^2=0:
dsolve(%,y(x));
```

$$\_C1 + \operatorname{arctanh}\left(\frac{\sqrt{y(x)}\;x}{\sqrt{x^2\,y(x) + 2\,x\,y(x) + 2}}\right) + \frac{1}{2}\,\frac{\sqrt{x^2\,y(x) + 2\,x\,y(x) + 2}}{\sqrt{y(x)}} = 0$$

Mathematica

```
Remove["Global`*"]
ode42 = y'[x] - x*(x + 2)*y[x]^3 - (x + 3)*y[x]^2 == 0
DSolve[%, y[x], x] // TraditionalForm
```

$$\text{Solve}\left[c_1 = -\left(\frac{i\sqrt{\frac{2}{\pi}}\,\sqrt{\frac{1}{2\,y(x)}+\frac{1}{4}(x+1)^2-\frac{1}{4}}\left(\frac{\sinh\left(\sqrt{\frac{1}{2\,y(x)}+\frac{1}{4}(x+1)^2-\frac{1}{4}}\right)}{\sqrt{\frac{1}{2\,y(x)}+\frac{1}{4}(x+1)^2-\frac{1}{4}}}-\cosh\left(\sqrt{\frac{1}{2\,y(x)}+\frac{1}{4}(x+1)^2-\frac{1}{4}}\right)\right)}{\sqrt{-i\sqrt{\frac{1}{2\,y(x)}+\frac{1}{4}(x+1)^2-\frac{1}{4}}}}-\frac{i\sqrt{\frac{2}{\pi}}\left(\frac{x+1}{2}+\frac{1}{2}\right)\sinh\left(\sqrt{\frac{1}{2\,y(x)}+\frac{1}{4}(x+1)^2-\frac{1}{4}}\right)}{\sqrt{-i\sqrt{\frac{1}{2\,y(x)}+\frac{1}{4}(x+1)^2-\frac{1}{4}}}}\right)\Bigg/\left(\frac{i\sqrt{\frac{2}{\pi}}\,\sqrt{\frac{1}{2\,y(x)}+\frac{1}{4}(x+1)^2-\frac{1}{4}}\left(i\sinh\left(\sqrt{\frac{1}{2\,y(x)}+\frac{1}{4}(x+1)^2-\frac{1}{4}}\right)-\frac{i\cosh\left(\sqrt{\frac{1}{2\,y(x)}+\frac{1}{4}(x+1)^2-\frac{1}{4}}\right)}{\sqrt{\frac{1}{2\,y(x)}+\frac{1}{4}(x+1)^2-\frac{1}{4}}}\right)}{\sqrt{-i\sqrt{\frac{1}{2\,y(x)}+\frac{1}{4}(x+1)^2-\frac{1}{4}}}}-\frac{\sqrt{\frac{2}{\pi}}\left(\frac{x+1}{2}+\frac{1}{2}\right)\cosh\left(\sqrt{\frac{1}{2\,y(x)}+\frac{1}{4}(x+1)^2-\frac{1}{4}}\right)}{\sqrt{-i\sqrt{\frac{1}{2\,y(x)}+\frac{1}{4}(x+1)^2-\frac{1}{4}}}}\right),\ y(x)\right]$$

#43

$$y'(x) + (3ax^2 + 4a^2x + b)\,y(x)^3 + 3xy(x)^2 = 0$$

Maple

```
restart;
ode43:=diff(y(x),x)+(3*a*x^2+4*a^2*x+b)*y(x)^3+3*x*y(x)^2=0:
dsolve(%,y(x));
```

$$\_C1 + \left(-\left(\frac{1}{2}\sqrt{\frac{-3\,b+4\,a^3}{a^3}} - \frac{1}{2}\,\frac{3\,x+2\,a}{a}\right)\mathrm{BesselK}\left(\frac{1}{2}\sqrt{\frac{-3\,b+4\,a^3}{a^3}},\right.\right.$$
$$\left.-\frac{1}{2}\sqrt{3}\sqrt{\frac{y(x)\,b+3\,y(x)\,a\,x^2+4\,y(x)\,a^2\,x-2\,a}{a^3\,y(x)}}\right)$$
$$-\frac{1}{2}\,\mathrm{BesselK}\left(\frac{1}{2}\sqrt{\frac{-3\,b+4\,a^3}{a^3}}+1,\right.$$
$$\left.-\frac{1}{2}\sqrt{3}\sqrt{\frac{y(x)\,b+3\,y(x)\,a\,x^2+4\,y(x)\,a^2\,x-2\,a}{a^3\,y(x)}}\right)$$
$$\left.\sqrt{3}\sqrt{\frac{y(x)\,b+3\,y(x)\,a\,x^2+4\,y(x)\,a^2\,x-2\,a}{a^3\,y(x)}}\right)\Bigg/\left(-\left(\frac{1}{2}\sqrt{\frac{-3\,b+4\,a^3}{a^3}}\right.\right.$$
$$\left.-\frac{1}{2}\,\frac{3\,x+2\,a}{a}\right)\mathrm{BesselI}\left(\frac{1}{2}\sqrt{\frac{-3\,b+4\,a^3}{a^3}},\right.$$
$$\left.-\frac{1}{2}\sqrt{3}\sqrt{\frac{y(x)\,b+3\,y(x)\,a\,x^2+4\,y(x)\,a^2\,x-2\,a}{a^3\,y(x)}}\right)$$
$$+\frac{1}{2}\,\mathrm{BesselI}\left(\frac{1}{2}\sqrt{\frac{-3\,b+4\,a^3}{a^3}}+1,\right.$$
$$\left.-\frac{1}{2}\sqrt{3}\sqrt{\frac{y(x)\,b+3\,y(x)\,a\,x^2+4\,y(x)\,a^2\,x-2\,a}{a^3\,y(x)}}\right)$$
$$\left.\sqrt{3}\sqrt{\frac{y(x)\,b+3\,y(x)\,a\,x^2+4\,y(x)\,a^2\,x-2\,a}{a^3\,y(x)}}\right)=0$$

Mathematica

```
Remove["Global`*"]
ode43 = y'[x] + (3*a*x^2 + 4*a^2*x + b)*y[x]^3 + 3*x*y[x]^2 == 0
DSolve[%, y[x], x] // TraditionalForm
```

$$\mathrm{Solve}\Bigg[c_1 = -\Bigg(i\sqrt{-\frac{4a^3-3b}{4a^3}-\frac{3}{2a^2\,y(x)}+\frac{(-2a-3x)^2}{4a^2}}\;J_{\frac{1}{2}\sqrt{\frac{4a^3-3b}{a^3}}+1}\left(-i\sqrt{\frac{(-2a-3x)^2}{4a^2}-\frac{4a^3-3b}{4a^3}-\frac{3}{2a^2\,y(x)}}\right)+$$
$$\left(\frac{1}{2}\sqrt{\frac{4a^3-3b}{a^3}}+\frac{-2a-3x}{2a}\right)J_{\frac{1}{2}\sqrt{\frac{4a^3-3b}{a^3}}}\left(-i\sqrt{\frac{(-2a-3x)^2}{4a^2}-\frac{4a^3-3b}{4a^3}-\frac{3}{2a^2\,y(x)}}\right)\Bigg)\Bigg/$$
$$\Bigg(i\sqrt{-\frac{4a^3-3b}{4a^3}-\frac{3}{2a^2\,y(x)}+\frac{(-2a-3x)^2}{4a^2}}\;Y_{\frac{1}{2}\sqrt{\frac{4a^3-3b}{a^3}}+1}\left(-i\sqrt{\frac{(-2a-3x)^2}{4a^2}-\frac{4a^3-3b}{4a^3}-\frac{3}{2a^2\,y(x)}}\right)+$$
$$\left(\frac{1}{2}\sqrt{\frac{4a^3-3b}{a^3}}+\frac{-2a-3x}{2a}\right)Y_{\frac{1}{2}\sqrt{\frac{4a^3-3b}{a^3}}}\left(-i\sqrt{\frac{(-2a-3x)^2}{4a^2}-\frac{4a^3-3b}{4a^3}-\frac{3}{2a^2\,y(x)}}\right)\Bigg),\,y(x)\Bigg]$$

#44

$$y'(x) + 2ax^3y(x)^3 + 2xy(x) = 0$$

Maple

```
restart;
ode44:=diff(y(x),x)+2*a*x^3*y(x)^3+2*x*y(x)=0:
dsolve(%,y(x));
```

$$y(x) = -\frac{2}{\sqrt{-2a - 4ax^2 + 4e^{2x^2}\_C1}}, y(x) = \frac{2}{\sqrt{-2a - 4ax^2 + 4e^{2x^2}\_C1}}$$

Mathematica

```
Remove["Global`*"]
ode44 = y'[x] + 2*a*x^3*y[x]^3 + 2*x*y[x] == 0
DSolve[%, y[x], x] // TraditionalForm
```

$$\left\{\left\{y(x) \to -\frac{\sqrt{2}}{\sqrt{-2ax^2 - a + 2c_1 e^{2x^2}}}\right\}, \left\{y(x) \to \frac{\sqrt{2}}{\sqrt{-2ax^2 - a + 2c_1 e^{2x^2}}}\right\}\right\}$$

#45

$$y'(x) + 2(a^2x^3 - b^2x)\, y(x)^3 + 3by(x)^2 = 0$$

Maple

```
restart;
ode45:=diff(y(x),x)+2*(a^2*x^3-b^2*x)*y(x)^3+3*b*y(x)^2=0:
dsolve(%,y(x));
```

$$\_C1 + \frac{\left(\left(\frac{a\,x}{b} + \frac{1}{\frac{b^2\,y(x)}{a} - \frac{b}{a\,x}}\right)^2 - 1\right)^{1/4}}{\left(\frac{b^2\,y(x)}{a} - \frac{b}{a\,x}\right)\sqrt{\frac{a\,x}{b} + \frac{1}{\frac{b^2\,y(x)}{a} - \frac{b}{a\,x}}}} - \left(\int^{\frac{a\,x^2\,y(x)}{b\,y(x)\,x-1}} \frac{\left(\_a^2 - 1\right)^{1/4}}{\sqrt{\_a}}\, d\_a\right) = 0$$

Mathematica

```
Remove["Global`*"]
ode45 = y'[x] + 2*(a^2*x^3 - b^2*x)*y[x]^3 + 3*b*y[x]^2 == 0
DSolve[%, y[x], x] // TraditionalForm
```

$$\text{Solve}\left[c_1 = \sqrt[4]{\left(\frac{b}{a\,x} - \frac{1}{a\,x^2\,y(x)}\right)^2 - 1}\left(-\frac{\left(\frac{b}{a\,x} - \frac{1}{a\,x^2\,y(x)}\right)\,_2F_1\left(\frac{1}{2}, \frac{3}{4}; \frac{3}{2}; \left(\frac{b}{a\,x} - \frac{1}{a\,x^2\,y(x)}\right)^2\right)}{2\sqrt[4]{1 - \left(\frac{b}{a\,x} - \frac{1}{a\,x^2\,y(x)}\right)^2}} - \frac{a\,x}{b}\right), y(x)\right]$$

#46

$$y'(x) - x^a y(x)^3 + 3y(x)^2 - x^{-a} y(x) - x^{-2a} + a x^{-a-1} = 0$$

Maple

```
restart;
ode46:=diff(y(x),x)-x^a*y(x)^3+3*y(x)^2-x^(-a)*y(x)-x^(-2*a)+a*x^(-a-1)=0:
dsolve(%,y(x));
```

$$y(x) = -e^{\frac{2x}{(a-1)x^a}} \Bigg/ \Bigg(\_C1 - \frac{1}{-a+1}\Bigg(2\,2^{-\frac{2a}{-a+1}-\frac{2}{-a+1}}\left(\frac{1}{-a+1}\right)^{-\frac{a}{-a+1}-\frac{1}{-a+1}}\Bigg(\frac{1}{\left(\frac{a}{-a+1}+\frac{1}{-a+1}\right)(-3+a)}\Bigg(2^{-3+\frac{2a}{-a+1}+\frac{2}{-a+1}+\frac{2}{a-1}}x^{-\frac{a^2}{-a+1}+\frac{1}{-a+1}-1+a}\left(\frac{1}{-a+1}\right)^{\frac{a}{-a+1}+\frac{1}{-a+1}}\left(-\frac{4x^{-a+1}a^2}{-a+1}-\frac{4x^{-a+1}}{-a+1}+\frac{8ax^{-a+1}}{-a+1}+2a-2\right)($$

$$-a+1)\left(\frac{x^{-a+1}}{-a+1}\right)^{\frac{1}{a-1}} e^{-\frac{2x^{-a+1}}{-a+1}}\,\mathrm{WhittakerM}\left(-\frac{a+1}{a-1}+\frac{1}{a-1}, -\frac{1}{a-1}+\frac{1}{2}, \frac{4x^{-a+1}}{-a+1}\right)\Bigg)$$

$$-\frac{2^{-1+\frac{2a}{-a+1}+\frac{2}{-a+1}+\frac{2}{a-1}}x^{-\frac{a^2}{-a+1}+\frac{1}{-a+1}-1+a}\left(\frac{1}{-a+1}\right)^{\frac{a}{-a+1}+\frac{1}{-a+1}}(-a+1)\left(\frac{x^{-a+1}}{-a+1}\right)^{\frac{1}{a-1}}e^{-\frac{2x^{-a+1}}{-a+1}}\,\mathrm{WhittakerM}\left(-\frac{a+1}{a-1}+\frac{1}{a-1}+1, -\frac{1}{a-1}+\frac{1}{2}, \frac{4x^{-a+1}}{-a+1}\right)}{\left(\frac{a}{-a+1}+\frac{1}{-a+1}\right)(-3+a)}\Bigg)\Bigg)\Bigg)^{1/2} + \frac{1}{x^a},\ y(x) = e^{\frac{2x}{(a-1)x^a}} \Bigg/$$

$$\Bigg(\_C1 - \frac{1}{-a+1}\Bigg(2\,2^{-\frac{2a}{-a+1}-\frac{2}{-a+1}}\left(\frac{1}{-a+1}\right)^{-\frac{a}{-a+1}-\frac{1}{-a+1}}\Bigg(\frac{1}{\left(\frac{a}{-a+1}+\frac{1}{-a+1}\right)(-3+a)}\Bigg(2^{-3+\frac{2a}{-a+1}+\frac{2}{-a+1}+\frac{2}{a-1}}x^{-\frac{a^2}{-a+1}+\frac{1}{-a+1}-1+a}\left(\frac{1}{-a+1}\right)^{\frac{a}{-a+1}+\frac{1}{-a+1}}\left(-\frac{4x^{-a+1}a^2}{-a+1}-\frac{4x^{-a+1}}{-a+1}+\frac{8ax^{-a+1}}{-a+1}+2a-2\right)($$

$$-a+1)\left(\frac{x^{-a+1}}{-a+1}\right)^{\frac{1}{a-1}} e^{-\frac{2x^{-a+1}}{-a+1}}\,\mathrm{WhittakerM}\left(-\frac{a+1}{a-1}+\frac{1}{a-1}, -\frac{1}{a-1}+\frac{1}{2}, \frac{4x^{-a+1}}{-a+1}\right)\Bigg)$$

$$-\frac{2^{-1+\frac{2a}{-a+1}+\frac{2}{-a+1}+\frac{2}{a-1}}x^{-\frac{a^2}{-a+1}+\frac{1}{-a+1}-1+a}\left(\frac{1}{-a+1}\right)^{\frac{a}{-a+1}+\frac{1}{-a+1}}(-a+1)\left(\frac{x^{-a+1}}{-a+1}\right)^{\frac{1}{a-1}}e^{-\frac{2x^{-a+1}}{-a+1}}\,\mathrm{WhittakerM}\left(-\frac{a+1}{a-1}+\frac{1}{a-1}+1, -\frac{1}{a-1}+\frac{1}{2}, \frac{4x^{-a+1}}{-a+1}\right)}{\left(\frac{a}{-a+1}+\frac{1}{-a+1}\right)(-3+a)}\Bigg)\Bigg)\Bigg)^{1/2} + \frac{1}{x^a}$$

Mathematica

```
Remove["Global`*"]
ode46=y'[x]-x^a*y[x]^3+3*y[x]^2-x^(-a)*y[x]-x^(-2*a)+a*x^(-a-1)==0
DSolve[%, y[x], x] // TraditionalForm
```

$$\left\{\left\{y(x) \to x^{-a} - \frac{e^{-\frac{2x^{1-a}}{1-a}}}{\sqrt{c_1 - \frac{2x\left(\frac{4^{\frac{a+1}{a-1}}\,x\left(\frac{x^{1-a}}{1-a}\right)^{\frac{2}{a-1}}\Gamma\left(-\frac{2}{a-1}, -\frac{4x^{1-a}}{a-1}\right)}{a-1} + e^{\frac{4x^{1-a}}{a-1}}x^a\right)}{a+1}}}\right\},\right.$$

$$\left.\left\{y(x) \to \frac{e^{-\frac{2x^{1-a}}{1-a}}}{\sqrt{c_1 - \frac{2x\left(\frac{4^{\frac{a+1}{a-1}}\,x\left(\frac{x^{1-a}}{1-a}\right)^{\frac{2}{a-1}}\Gamma\left(-\frac{2}{a-1}, -\frac{4x^{1-a}}{a-1}\right)}{a-1} + e^{\frac{4x^{1-a}}{a-1}}x^a\right)}{a+1}}} + x^{-a}\right\}\right\}$$

#47

$$y'(x) - a(x^n - x)\,y(x)^3 - y(x)^2 = 0$$

Maple

```
restart;
ode47:=diff(y(x),x)-a*(x^n-x)*y(x)^3-y(x)^2=0:
dsolve(%,y(x));
```

No output

Mathematica

```
Remove["Global`*"]
ode47 = y'[x] - a*(x^n - x)*y[x]^3 - y[x]^2 == 0
DSolve[%, y[x], x] // TraditionalForm
```

$$\text{DSolve}\left[-a\,(x^n - x)\,y(x)^3 + y'(x) - y(x)^2 = 0,\ y(x),\ x\right]$$

#48

$$y'(x) - (ax^n + bx)\,y(x)^3 - cy(x)^2 = 0$$

Maple

```
restart;
ode48:=diff(y(x),x)-(a*x^n+b*x)*y(x)^3-c*y(x)^2=0:
dsolve(%,y(x));
```

No output

Mathematica

```
Remove["Global`*"]
ode48 = y'[x] - (a*x^n + b*x)*y[x]^3 - c*y[x]^2 == 0
DSolve[%, y[x], x] // TraditionalForm
```

$$\text{DSolve}\left[y(x)^3\,(-(a\,x^n + b\,x)) - c\,y(x)^2 + y'(x) = 0,\ y(x),\ x\right]$$

#49

$$y'(x) + a\phi'(x)\,y(x)^3 + 6a\phi(x)\,y(x)^2 + (2a+1)\,y(x)\,\frac{\phi''(x)}{\phi'(x)} + 2a + 2 = 0$$

Maple

```
restart;
ode49:=diff(y(x),x)+a*diff(phi(x),x)*y(x)^3+6*a*phi(x)*y(x)^2+(2*a+1)*y(x)*diff(phi(x
dsolve(%,y(x));
```

$$ode49 := \frac{d}{dx}\,y(x) + a\left(\frac{d}{dx}\,\phi(x)\right)y(x)^3 + 6\,a\,\phi(x)\,y(x)^2 + \frac{(2\,a+1)\,y(x)\left(\frac{d^2}{dx^2}\,\phi(x)\right)}{\frac{d}{dx}\,\phi(x)} + 2\,a + 2 = 0$$

Mathematica

```
Remove["Global`*"]
ode49 = y'[x] + a*phi'[x]*y[x]^3 +
   6*a*phi[x]*y[x]^2 + (2*a + 1)*y[x]*phi''[x]/phi'[x] + 2*a + 2 == 0
DSolve[%, y[x], x] // TraditionalForm
```

$$\text{DSolve}\left[a\,y(x)^3\,\text{phi}'(x) + \frac{(2\,a+1)\,y(x)\,\text{phi}''(x)}{\text{phi}'(x)} + 6\,a\,\text{phi}(x)\,y(x)^2 + 2\,a + y'(x) + 2 = 0,\ y(x),\ x\right]$$

#50

$$y'(x) - f_3(x)\, y(x)^3 - f_2(x)\, y(x)^2 - f_1(x)\, y(x) - f_0(x) = 0$$

Maple

```
restart;
ode50:=diff(y(x),x)-f3(x)*y(x)^3-f2(x)*y(x)^2-f1(x)*y(x)-f0(x)=0;
dsolve(%,y(x));
```

$$ode50 := \frac{d}{dx}\, y(x) - f3(x)\, y(x)^3 - f2(x)\, y(x)^2 - f1(x)\, y(x) - f0(x) = 0$$

Mathematica

```
Remove["Global`*"]
ode50 = y'[x] - f3[x]*y[x]^3 - f2[x]*y[x]^2 - f1[x]*y[x] - f0[x] == 0
DSolve[%, y[x], x] // TraditionalForm
```

$$\text{DSolve}\left[-\text{f0}(x) - \text{f1}(x)\, y(x) - \text{f2}(x)\, y(x)^2 - \text{f3}(x)\, y(x)^3 + y'(x) = 0,\ y(x),\ x\right]$$

#51

$$y'(x)-(y(x)-f(x))\,(y(x)-g(x))\left(y(x)-\frac{af(x)+bg(x)}{a+b}\right)h(x)-\frac{f'(x)(y(x)-g(x))}{f(x)-g(x)}-\frac{g'(x)(y(x)-f(x))}{g(x)-f(x)}=0$$

Maple

```
restart;
ode51:=diff(y(x),x)-(y(x)-f(x))*(y(x)-g(x))*(y(x)-(a*f(x)+b*g(x))/(a+b))*h(x)-
diff(f(x),x)*(y(x)-g(x))/(f(x)-g(x))-diff(g(x),x)*(y(x)-f(x))/(g(x)-f(x))=0;
dsolve(%,y(x));
```

$$y(x)=\frac{1}{9}\frac{1}{a^3+2a^2b+2ab^2+b^3}\Bigg(3\,\mathrm{RootOf}\Bigg(-27\left(\int^{\_Z}(a^2+b^2+ab)^3\Big/(-3\_a^3a^4b^2-26\_a^3a^3b^3-3\_a^3a^2b^4+12\_a^3a^5b+4\_a^3a^6+12\_a^3ab^5+4\_a^3b^6-27\_aa^6-162\_aa^4b^2-81\_aa^5b-162\_aa^2b^4-189\_aa^3b^3-27\_ab^6-81\_aab^5+27a^6+162a^4b^2+81a^5b+162a^2b^4+189a^3b^3+27b^6+81ab^5)\,d\_a\right)+\int\frac{1}{3}\frac{(a^2f(x)^2+b^2f(x)^2+abf(x)^2-2abf(x)g(x)-2b^2f(x)g(x)-2a^2f(x)g(x)+abg(x)^2+a^2g(x)^2+b^2g(x)^2)h(x)}{(a+b)^2}dx+\_C1\Bigg)a^2bf(x)$$
$$-3\,\mathrm{RootOf}\Bigg(-27\left(\int^{\_Z}(a^2+b^2+ab)^3\Big/(-3\_a^3a^4b^2-26\_a^3a^3b^3-3\_a^3a^2b^4+12\_a^3a^5b+4\_a^3a^6+12\_a^3ab^5+4\_a^3b^6-27\_aa^6-162\_aa^4b^2-81\_aa^5b-162\_aa^2b^4-189\_aa^3b^3-27\_ab^6-81\_aab^5+27a^6+162a^4b^2+81a^5b+162a^2b^4+189a^3b^3+27b^6+81ab^5)\,d\_a\right)+\int\frac{1}{3}\frac{(a^2f(x)^2+b^2f(x)^2+abf(x)^2-2abf(x)g(x)-2b^2f(x)g(x)-2a^2f(x)g(x)+abg(x)^2+a^2g(x)^2+b^2g(x)^2)h(x)}{(a+b)^2}dx+\_C1\Bigg)b^2af(x)$$
$$+2\,\mathrm{RootOf}\Bigg(-27\left(\int^{\_Z}(a^2+b^2+ab)^3\Big/(-3\_a^3a^4b^2-26\_a^3a^3b^3-3\_a^3a^2b^4+12\_a^3a^5b+4\_a^3a^6+12\_a^3ab^5+4\_a^3b^6-27\_aa^6-162\_aa^4b^2-81\_aa^5b-162\_aa^2b^4-189\_aa^3b^3-27\_ab^6-81\_aab^5+27a^6+162a^4b^2+81a^5b+162a^2b^4+189a^3b^3+27b^6+81ab^5)\,d\_a\right)+\int\frac{1}{3}\frac{(a^2f(x)^2+b^2f(x)^2+abf(x)^2-2abf(x)g(x)-2b^2f(x)g(x)-2a^2f(x)g(x)+abg(x)^2+a^2g(x)^2+b^2g(x)^2)h(x)}{(a+b)^2}dx+\_C1\Bigg)a^3f(x)$$
$$-2\,\mathrm{RootOf}\Bigg(-27\left(\int^{\_Z}(a^2+b^2+ab)^3\Big/(-3\_a^3a^4b^2-26\_a^3a^3b^3-3\_a^3a^2b^4+12\_a^3a^5b+4\_a^3a^6+12\_a^3ab^5+4\_a^3b^6-27\_aa^6-162\_aa^4b^2-81\_aa^5b-162\_aa^2b^4-189\_aa^3b^3-27\_ab^6-81\_aab^5+27a^6+162a^4b^2+81a^5b+162a^2b^4+189a^3b^3+27b^6+81ab^5)\,d\_a\right)+\int\frac{1}{3}\frac{(a^2f(x)^2+b^2f(x)^2+abf(x)^2-2abf(x)g(x)-2b^2f(x)g(x)-2a^2f(x)g(x)+abg(x)^2+a^2g(x)^2+b^2g(x)^2)h(x)}{(a+b)^2}dx+\_C1\Bigg)b^3f(x)$$
$$-3\,\mathrm{RootOf}\Bigg(-27\left(\int^{\_Z}(a^2+b^2+ab)^3\Big/(-3\_a^3a^4b^2-26\_a^3a^3b^3-3\_a^3a^2b^4+12\_a^3a^5b+4\_a^3a^6+12\_a^3ab^5+4\_a^3b^6-27\_aa^6-162\_aa^4b^2-81\_aa^5b-162\_aa^2b^4-189\_aa^3b^3-27\_ab^6-81\_aab^5+27a^6+162a^4b^2+81a^5b+162a^2b^4+189a^3b^3+27b^6+81ab^5)\,d\_a\right)+\int\frac{1}{3}\frac{(a^2f(x)^2+b^2f(x)^2+abf(x)^2-2abf(x)g(x)-2b^2f(x)g(x)-2a^2f(x)g(x)+abg(x)^2+a^2g(x)^2+b^2g(x)^2)h(x)}{(a+b)^2}dx+\_C1\Bigg)a^2bg(x)$$
$$+3\,\mathrm{RootOf}\Bigg(-27\left(\int^{\_Z}(a^2+b^2+ab)^3\Big/(-3\_a^3a^4b^2-26\_a^3a^3b^3-3\_a^3a^2b^4+12\_a^3a^5b+4\_a^3a^6+12\_a^3ab^5+4\_a^3b^6-27\_aa^6-162\_aa^4b^2-81\_aa^5b-162\_aa^2b^4-189\_aa^3b^3-27\_ab^6-81\_aab^5+27a^6+162a^4b^2+81a^5b+162a^2b^4+189a^3b^3+27b^6+81ab^5)\,d\_a\right)+\int\frac{1}{3}\frac{(a^2f(x)^2+b^2f(x)^2+abf(x)^2-2abf(x)g(x)-2b^2f(x)g(x)-2a^2f(x)g(x)+abg(x)^2+a^2g(x)^2+b^2g(x)^2)h(x)}{(a+b)^2}dx+\_C1\Bigg)ab^2g(x)$$
$$-2\,\mathrm{RootOf}\Bigg(-27\left(\int^{\_Z}(a^2+b^2+ab)^3\Big/(-3\_a^3a^4b^2-26\_a^3a^3b^3-3\_a^3a^2b^4+12\_a^3a^5b+4\_a^3a^6+12\_a^3ab^5+4\_a^3b^6-27\_aa^6-162\_aa^4b^2-81\_aa^5b-162\_aa^2b^4-189\_aa^3b^3-27\_ab^6-81\_aab^5+27a^6+162a^4b^2+81a^5b+162a^2b^4+189a^3b^3+27b^6+81ab^5)\,d\_a\right)+\int\frac{1}{3}\frac{(a^2f(x)^2+b^2f(x)^2+abf(x)^2-2abf(x)g(x)-2b^2f(x)g(x)-2a^2f(x)g(x)+abg(x)^2+a^2g(x)^2+b^2g(x)^2)h(x)}{(a+b)^2}dx+\_C1\Bigg)a^3g(x)$$
$$+2\,\mathrm{RootOf}\Bigg(-27\left(\int^{\_Z}(a^2+b^2+ab)^3\Big/(-3\_a^3a^4b^2-26\_a^3a^3b^3-3\_a^3a^2b^4+12\_a^3a^5b+4\_a^3a^6+12\_a^3ab^5+4\_a^3b^6-27\_aa^6-162\_aa^4b^2-81\_aa^5b-162\_aa^2b^4-189\_aa^3b^3-27\_ab^6-81\_aab^5+27a^6+162a^4b^2+81a^5b+162a^2b^4+189a^3b^3+27b^6+81ab^5)\,d\_a\right)+\int\frac{1}{3}\frac{(a^2f(x)^2+b^2f(x)^2+abf(x)^2-2abf(x)g(x)-2b^2f(x)g(x)-2a^2f(x)g(x)+abg(x)^2+a^2g(x)^2+b^2g(x)^2)h(x)}{(a+b)^2}dx+\_C1\Bigg)b^3g(x)$$
$$+6a^3f(x)+9a^2bf(x)+9a^2bg(x)+3a^3g(x)+9b^2af(x)+3b^3f(x)+6b^3g(x)+9b^2ag(x)\Bigg)$$

Mathematica

```
Remove["Global`*"]
ode51 = D[y[x],x] - (y[x] - f[x])*(y[x] -g[x])*(y[x] - (a*f[x] + b*g[x])/(a + b))*h[x
   D[f[x], x]*(y[x] - g[x])/(f[x] - g[x])-D[g[x], x]*(y[x] - f[x])/(g[x] - f[x]) == (
DSolve[%, y[x], x] // TraditionalForm
```

$$\mathrm{Solve}\Bigg[-\frac{1}{3}(a-b)^{2/3}(2a+b)^{2/3}(a+2b)^{2/3}\,\mathrm{RootSum}\Bigg[\#1^3(a-b)^{2/3}(2a+b)^{2/3}(a+2b)^{2/3}-3\#1a^2-3\#1ab-3\#1b^2+(a-b)^{2/3}(2a+b)^{2/3}(a+2b)^{2/3}\,\&,$$
$$\frac{\log\left(\frac{\frac{-2af(x)h(x)-ag(x)h(x)-bf(x)h(x)-2bg(x)h(x)}{a+b}+3h(x)y(x)}{\sqrt[3]{\frac{(f(x)-g(x))^3\left(2a^3h(x)^3+3a^2bh(x)^3-3ab^2h(x)^3-2b^3h(x)^3\right)}{(a+b)^3}}}-\#1\right)}{-\#1^2(a-b)^{2/3}(2a+b)^{2/3}(a+2b)^{2/3}+a^2+ab+b^2}\,\&\Bigg]=\int_1^x\frac{\left(\frac{(f(K[1])-g(K[1]))^3\left(2a^3h(K[1])^3+3a^2bh(K[1])^3-3ab^2h(K[1])^3-2b^3h(K[1])^3\right)}{(a+b)^3}\right)^{2/3}}{9h(K[1])}dK[1]+$$

#52

$y'(x) - bx^{\frac{n}{1-n}} - ay(x)^n = 0$

Maple

```
restart;
ode52:=diff(y(x),x)-b*x^(n/(1-n))-a*y(x)^n=0;
dsolve(%,y(x));
```

$$-\left(\int_{\_b}^{y(x)} \frac{x^{\frac{n}{-1+n}}}{\left(a\,x\,(-1+n)\,\_a^n + \_a\right) x^{\frac{n}{-1+n}} + b\,(-1+n)\,x}\, d\_a\right)(-1+n) + \ln(x) - \_C1 = 0$$

Mathematica

```
Remove["Global`*"]
ode52 = D[y[x], x] - a*y[x]^n - b*x^(n/(1 - n)) == 0
DSolve[%, y[x], x] // TraditionalForm
```

$$\text{Solve}\left[\int_1^{y(x)\left(\frac{a\,x^{-\frac{n}{1-n}}}{b}\right)^{\frac{1}{n}}} \frac{1}{-K[1]\left(\frac{(-1)^n (n-1)^{-n} b^{1-n}}{a}\right)^{\frac{1}{n}} + K[1]^n + 1}\, dK[1] = \int_1^x b\,K[2]^{\frac{n}{1-n}} \left(\frac{a\,K[2]^{-\frac{n}{1-n}}}{b}\right)^{\frac{1}{n}} dK[2] + c_1,\ y(x)\right]$$

#53

$$y'(x) - \frac{y(x)f'(x)}{f(x)} - f(x)\,g'(x) - f(x)^{1-n}\,(b+ag(x))^{-n}\,y(x)^n\,g'(x) = 0$$

Maple

```
restart;
ode53:=diff(y(x),x)-(y(x)*diff(f(x),x))/f(x)-f(x)*diff(g(x),x)-
f(x)^(1-n)/(b+a*g(x))^n*y(x)^n*diff(g(x),x)=0;
dsolve(%,y(x));
```

$$y(x) = \frac{1}{a}\left(\mathit{RootOf}\left(\int^{\_Z} \left(\left((b+a\,g(x))^{-n}\left(\frac{d}{dx}g(x)\right)f(x)^{1-n}\right)^{-n-1}\left(f(x)\left(\frac{d}{dx}g(x)\right)\right)^{-2n+1}\left(n\,a\,(b+a\,g(x))^{-n-1}\left(\frac{d}{dx}g(x)\right)^{3}f(x)^{2-n}\right)^{n}n^{-n}\right)\Bigg/\left(\_a^{n} - \_a\left((b+a\,g(x))^{-n}\left(\frac{d}{dx}g(x)\right)f(x)^{1-n}\right)^{-n-1}\left(f(x)\left(\frac{d}{dx}g(x)\right)\right)^{-2n+1}\left(n\,a\,(b+a\,g(x))^{-n-1}\left(\frac{d}{dx}g(x)\right)^{3}f(x)^{2-n}\right)^{n}n^{-n} + \left((b+a\,g(x))^{-n}\left(\frac{d}{dx}g(x)\right)f(x)^{1-n}\right)^{-n-1}\left(f(x)\left(\frac{d}{dx}g(x)\right)\right)^{-2n+1}\left(n\,a\,(b+a\,g(x))^{-n-1}\left(\frac{d}{dx}g(x)\right)^{3}f(x)^{2-n}\right)^{n}n^{-n}\right)d\_a - \ln(b+a\,g(x)) + \_C1\right)(b+a\,g(x))\,f(x)\right)$$

Mathematica

```
Remove["Global`*"]
ode53 = y'[x] - f[x]^(1 - n)*g'[x]*y[x]^n/(a*g[x] + b)^n -
   f'[x]*y[x]/f[x] - f[x]*g'[x] == 0
DSolve[%, y[x], x] // TraditionalForm
```

$$\text{Solve}\left[\int_1^{y(x)\left(f(x)^{-n}(a\,g(x)+b)^{-n}\right)^{\frac{1}{n}}} \frac{1}{-(a^n)^{\frac{1}{n}}\,K[1]+K[1]^n+1}\,dK[1] =\right.$$

#54

$y'(x) - a^n f(x)^{1-n}\, y(x)^n\, g'(x) - \frac{y(x)\,f'(x)}{f(x)} - f(x)\, g'(x) = 0$

Maple

```
restart;
ode54:=diff(y(x),x)-a^n*f(x)^(1-n)*diff(g(x),x)*y(x)^n-(diff(f(x),x)*y(x))/f(x)-f(x)*
dsolve(%,y(x));
```

$$\_C1 + \frac{y(x)\ \mathrm{hypergeom}\left(\left[1, \frac{1}{n}\right], \left[\frac{n+1}{n}\right], -\left(\frac{a\, y(x)}{f(x)}\right)^n\right)}{f(x)} - g(x) = 0$$

Mathematica

```
Remove["Global`*"]
ode54=y'[x]-a^n*f[x]^(1-n)*g'[x]*y[x]^n-f'[x]*y[x]/f[x]-f[x]*g'[x]==0
DSolve[%,y[x],x]//TraditionalForm
```

$$\mathrm{Solve}\left[y(x)\,(a^n\, f(x)^{-n})^{\frac{1}{n}}\ {}_2F_1\left(1, \frac{1}{n}; 1+\frac{1}{n}; -\left((a^n\, f(x)^{-n})^{\frac{1}{n}}\, y(x)\right)^n\right) = f(x)\, g(x)\,(a^n\, f(x)^{-n})^{\frac{1}{n}} + c_1,\ y(x)\right]$$

#55

$y'(x) - f(x)\, y(x)^n - g(x)\, y(x) - h(x) = 0$

Maple

```
restart;
ode55:=diff(y(x),x)-f(x)*y(x)^n-g(x)*y(x)-h(x)=0:
dsolve(%,y(x));
```

No answer

Mathematica

```
Remove["Global`*"]
ode55 = y'[x] - f[x]*y[x]^n - g[x]*y[x] - h[x] == 0
DSolve[%, y[x], x] // TraditionalForm
```

$$\mathrm{DSolve}[-f(x)\, y(x)^n - g(x)\, y(x) - h(x) + y'(x) = 0,\ y(x),\ x]$$

#56

$y'(x) - f(x)\,y(x)^a - g(x)\,y(x)^b = 0$

Maple

```
restart;
ode56:=diff(y(x),x)-f(x)*y(x)^a-g(x)*y(x)^b=0:
dsolve(%,y(x));
```

No answer

Mathematica

```
Remove["Global`*"]
ode56=y'[x]-f[x]*y[x]^a-g[x]*y[x]^b==0
DSolve[%,y[x],x]//TraditionalForm
```

$\text{DSolve}\left[-f(x)\,y(x)^a - g(x)\,y(x)^b + y'(x) = 0,\ y(x),\ x\right]$

#57

$y'(x) - \sqrt{|y(x)|} = 0$

Maple

```
restart;
ode57:=diff(y(x),x)-sqrt(abs(y(x)))=0:
dsolve(%,y(x));
```

$$x - \left(\begin{cases} -2\sqrt{-y(x)} & y(x) \le 0 \\ 2\sqrt{y(x)} & 0 < y(x) \end{cases}\right) + \_C1 = 0$$

Mathematica

```
Remove["Global`*"]
ode57=y'[x]-Abs[y[x]]^(1/2)==0
DSolve[%,y[x],x]//TraditionalForm
```

$$\Big\{\Big\{y(x) \to \text{InverseFunction}\Big[-\Big(2\times 2^{3/4}\,(1-\#1)\,\sqrt[4]{|\text{Im}(\#1)| + i\,(1-\text{Re}(\#1))}\,\left(i\,|\text{Im}(\#1)| - \text{Re}(\#1) + 1\right)$$

$$\,_2F_1\left(\frac{1}{4}, \frac{3}{4}; \frac{7}{4}; \frac{2\,|\text{Im}(\#1)| + i\left(\#1^* + \#1 - 2\right)}{4\,|\text{Im}(\#1)|}\right)\Big) \Big/ \Big(3\,\sqrt[4]{|\text{Im}(\#1)|}\,\left(\text{Im}(\#1)^2 + (1-\text{Re}(\#1))\right.$$

$$\Big(2\times 2^{3/4}\,(1-\#1)\left(-i\,|\text{Im}(\#1)| + \text{Im}(\#1)^2 + \text{Re}(\#1)^2 - \text{Re}(\#1)\right)$$

$$\sqrt[4]{\frac{|\text{Im}(\#1)| + i\left((1-\text{Re}(\#1))\,\text{Re}(\#1) - \text{Im}(\#1)^2\right)}{\text{Im}(\#1)^2 + \text{Re}(\#1)^2}}$$

$$\,_2F_1\left(\frac{1}{4}, \frac{3}{4}; \frac{7}{4}; \frac{2\,|\text{Im}(\#1)| + i\left(2\,|\#1|^2 - \#1^* - \#1\right)}{4\,|\text{Im}(\#1)|}\right)\Big) \Big/$$

$$\left(3\,\sqrt[4]{|\text{Im}(\#1)|}\,\left(\text{Im}(\#1)^2 + (1-\text{Re}(\#1))^2\right)\right)\ \&\Big][c_1 + x]\Big\}\Big\}$$

#58

$y'(x) - ay(x)^{\frac{1}{2}} - bx = 0$

Maple

```
restart;
ode58:=diff(y(x),x)-a*y(x)^(1/2)-b*x=0:
dsolve(%,y(x));
```

$$-\frac{1}{2}\ln\left(-2\,y(x)+x\,a\sqrt{y(x)}+b\,x^2\right)+\frac{a\sqrt{y(x)}\,\operatorname{arctanh}\left(\frac{a\sqrt{y(x)}+2\,b\,x}{\sqrt{y(x)\,(8\,b+a^2)}}\right)}{\sqrt{y(x)\,(8\,b+a^2)}}+\_C1=0$$

Mathematica

```
Remove["Global`*"]
ode58 = y'[x] - a*y[x]^(1/2) - b*x == 0
DSolve[%, y[x], x] // TraditionalForm
```

$$\text{Solve}\left[\frac{a^2\left(-\log\left(a^2\left(\sqrt{\frac{a^2\,y(x)}{b^2\,x^2}}+1\right)-\frac{2\,a^2\,y(x)}{b\,x^2}\right)-\frac{2\,a\tanh^{-1}\left(\frac{a^2-4\,b\sqrt{\frac{a^2\,y(x)}{b^2\,x^2}}}{a\sqrt{a^2+8\,b}}\right)}{\sqrt{a^2+8\,b}}\right)}{2\,b}=\frac{a^2\log(x)}{b}+c_1,\,y(x)\right]$$

#59

$$y'(x) - a\left(y(x)^2 + 1\right)^{\frac{1}{2}} - b = 0$$

Maple

```
restart;
ode59:=diff(y(x),x)-a*(y(x)^2+1)^(1/2)-b=0:
dsolve(%,y(x));
```

$$x - \left(\int^{y(x)} \frac{1}{a\sqrt{\_a^2 + 1} + b}\, d\_a\right) + \_C1 = 0$$

Mathematica

```
Remove["Global`*"]
ode59 = y'[x] - a*(y[x]^2 + 1)^(1/2) - b == 0
DSolve[%, y[x], x] // TraditionalForm
```

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\frac{\frac{b \tan^{-1}\left(\frac{\#1\, b}{\sqrt{\#1^2+1}\, \sqrt{a^2-b^2}}\right)}{\sqrt{a^2-b^2}} - \frac{b \tan^{-1}\left(\frac{\#1\, a}{\sqrt{a^2-b^2}}\right)}{\sqrt{a^2-b^2}} + \sinh^{-1}(\#1)}{a} \&\right][c_1 + x]\right\}\right\}$$

#60

$$y'(x) - \frac{\left(y(x)^2-1\right)^{\frac{1}{2}}}{(x^2-1)^{\frac{1}{2}}} = 0$$

Maple

```
restart;
ode60:=diff(y(x),x)-(y(x)^2-1)^(1/2)/(x^2-1)^(1/2)=0:
dsolve(%,y(x));
```

$$\ln\left(x + \sqrt{x^2 - 1}\right) - \ln\left(y(x) + \sqrt{y(x)^2 - 1}\right) + \_C1 = 0$$

Mathematica

```
Remove["Global`*"]
ode60 = y'[x] - (y[x]^2 - 1)^(1/2)/(x^2 - 1)^(1/2) == 0
DSolve[%, y[x], x] // TraditionalForm
```

$$\left\{\left\{y(x) \to \frac{1}{2}\left(-e^{-c_1}\sqrt{x^2-1} + e^{c_1}\sqrt{x^2-1} + e^{-c_1}x + e^{c_1}x\right)\right\}\right\}$$

#61

$$y'(x) - \frac{(x^2-1)^{\frac{1}{2}}}{\left(y(x)^2-1\right)^{\frac{1}{2}}} = 0$$

Maple

```
restart;
ode61:=diff(y(x),x)-(x^2-1)^(1/2)/(y(x)^2-1)^(1/2)=0:
dsolve(%,y(x));
```

$$\_C1 + x\sqrt{x^2-1} - \ln\left(x+\sqrt{x^2-1}\right) - y(x)\sqrt{y(x)^2-1} + \ln\left(y(x)+\sqrt{y(x)^2-1}\right) = 0$$

Mathematica

```
Remove["Global`*"]
ode61 = y'[x] - (x^2 - 1)^(1/2)/(y[x]^2 - 1)^(1/2) == 0
DSolve[%, y[x], x] // TraditionalForm
```

$$\Big\{\Big\{y(x) \to \text{InverseFunction}\left[\frac{1}{2}\,\#1\,\sqrt{\#1^2-1} - \frac{1}{2}\log\left(\sqrt{\#1^2-1}+\#1\right)\&\right]\left[c_1 + \frac{1}{2}\sqrt{x^2-1}\;x - \frac{1}{2}\log\left(\sqrt{x^2-1}\right.\right.$$

#62

$$y'(x) - \frac{y(x) - x^2\sqrt{x^2 - y(x)^2}}{x + xy(x)\sqrt{x^2 - y(x)^2}} = 0$$

Maple

```
restart;
ode62:=diff(y(x),x)-(y(x)-x^2*(x^2-y(x)^2)^(1/2))/(x+x*y(x)*(x^2-y(x)^2)^(1/2))=0:
dsolve(%,y(x));
```

$$\arctan\left(\frac{y(x)}{\sqrt{x^2 - y(x)^2}}\right) + \frac{1}{2}\,y(x)^2 + \frac{1}{2}\,x^2 - \_C1 = 0$$

Mathematica

```
Remove["Global`*"]
ode62 = D[y[x],x] - (y[x] -
       x^2*(x^2 - y[x]^2)^(1/2))/(x*y[x]*(x^2 - y[x]^2)^(1/2) + x)==0;
DSolve[%, y[x], x] // TraditionalForm
```

$$\text{Solve}\left[\tan^{-1}\left(\frac{y(x)}{\sqrt{x^2 - y(x)^2}}\right) + \frac{x^2}{2} + \frac{y(x)^2}{2} = c_1,\, y(x)\right]$$

#63

$$y'(x) - \frac{1+y(x)^2}{(1+x)^{3/2}\left|y(x)+\sqrt{1+y(x)}\right|} = 0$$

Maple

```
restart;
ode63:=diff(y(x),x)-(1+y(x)^2)/((1+x)^(3/2)*abs(y(x)+sqrt(1+y(x))))=0:
dsolve(%,y(x));
```

$$-\frac{2}{\sqrt{1+x}} - \left(\int^{y(x)} \frac{\left|\_a+\sqrt{1+\_a}\right|}{1+\_a^2}\,\mathrm{d}\_a\right) + \_C1 = 0$$

Mathematica

```
Remove["Global`*"];
ode63 = D[y[x],x]-(y[x]^2 + 1)/(Abs[y[x]+(1+y[x])^(1/2)]*(1+x)^(3/2))==0
DSolve[%, y[x], x] // TraditionalForm
```

No answer after 10 minutes wait

#64

$y'(x) - \sqrt{\frac{c+by(x)+ay(x)^2}{c+bx+ax^2}} = 0$

Maple

```
restart;
ode64:=diff(y(x),x)-sqrt((c+b*y(x)+a*y(x)^2)/(c+b*x+a*x^2))=0:
dsolve(%,y(x));
```

$$-\frac{\sqrt{\frac{c+b\,y(x)+a\,y(x)^2}{c+b\,x+a\,x^2}}\sqrt{c+b\,x+a\,x^2}\,\ln\left(\frac{1}{2}\,\frac{2\,a\,x+b+2\sqrt{c+b\,x+a\,x^2}\,\sqrt{a}}{\sqrt{a}}\right)}{\sqrt{c+b\,y(x)+a\,y(x)^2}\,\sqrt{a}} + \frac{\ln\left(\frac{\frac{1}{2}\,b+a\,y(x)}{\sqrt{a}}+\sqrt{c+b\,y(x)+a\,y(x)^2}\right)}{\sqrt{a}} + \_C1 = 0$$

Mathematica

```
Clear["Global`*"];
ode64 =D[y[x], x] - ((a*y[x]^2 + b*y[x] + c)/(a*x^2 + b*x + c))^(1/2)==0
DSolve[%, y[x], x] // TraditionalForm
```

$$\left\{\left\{y(x)\to\frac{1}{a\left(16\,a\,c-4\,b^2\right)}\,e^{-\sqrt{a}\,c_1}\left(8\,a^{3/2}\,c\,e^{2\sqrt{a}\,c_1}\sqrt{a\,x^2+b\,x+c}-8\,a^{3/2}\,c\sqrt{a\,x^2+b\,x+c}+8\,a^2\,c\,x\,e^{2\sqrt{a}\,c_1}+8\,a^2\,c\,x+2\,b^3\,e^{\sqrt{a}\,c_1}-b^3\,e^{2\sqrt{a}\,c_1}-2\sqrt{a}\,b^2\,e^{2\sqrt{a}\,c_1}\sqrt{a\,x^2+b\,x+c}+2\sqrt{a}\,b^2\sqrt{a\,x^2+b\,x+c}-2\,a\,b^2\,x\,e^{2\sqrt{a}\,c_1}-2\,a\,b^2\,x-8\,a\,b\,c\,e^{\sqrt{a}\,c_1}+4\,a\,b\,c\,e^{2\sqrt{a}\,c_1}+4\,a\,b\,c-b^3\right)\right\}\right\}$$

#65

$$y'(x) - \sqrt{\frac{1+y(x)^3}{1+x^3}} = 0$$

Maple

```
restart;
ode65:=diff(y(x),x)-sqrt((1+y(x)^3)/(1+x^3))=0:
dsolve(%,y(x));
```

$$\int^{y(x)} \frac{1}{\sqrt{1+\_a^3}}\, d\_a + \int^{x} \left(- \frac{\sqrt{\frac{1+y(x)^3}{1+\_a^3}}}{\sqrt{1+y(x)^3}} \right) d\_a + \_C1 = 0$$

Mathematica

```
Clear["Global`*"];
ode65 = D[y[x], x] - ((y[x]^3 + 1)/(x^3 + 1))^(1/2) == 0
DSolve[%, y[x], x] // TraditionalForm
```

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\frac{i\,(\#1+1)\sqrt{1+\frac{6i}{(\sqrt{3}-3i)(\#1+1)}}\,\sqrt{\frac{2}{3}-\frac{4i}{(\sqrt{3}+3i)(\#1+1)}}\,F\left(i\sinh^{-1}\left(\frac{\sqrt{-\frac{6i}{3i+\sqrt{3}}}}{\sqrt{\#1+1}}\right)\middle|\frac{3i+\sqrt{3}}{3i-\sqrt{3}}\right.}{\sqrt{-\frac{i}{\sqrt{3}+3i}}\,\sqrt{\#1^2-\#1+1}}\right.\right.\right.$$

$$\left.\left.\left. c_1 + \frac{i\,(x+1)\sqrt{1+\frac{6i}{(\sqrt{3}-3i)(x+1)}}\,\sqrt{\frac{2}{3}-\frac{4i}{(\sqrt{3}+3i)(x+1)}}\,F\left(i\sinh^{-1}\left(\frac{\sqrt{-\frac{6i}{3i+\sqrt{3}}}}{\sqrt{x+1}}\right)\middle|\frac{3i+\sqrt{3}}{3i-\sqrt{3}}\right)}{\sqrt{-\frac{i}{\sqrt{3}+3i}}\,\sqrt{x^2-x+1}}\right]\right\}\right\}$$

#66

$$y'(x) - \sqrt{\frac{|(1-y(x))y(x)(1-ay(x))|}{|(1-x)x(1-ax)|}} = 0$$

Maple

```
restart;
ode66:=diff(y(x),x)-sqrt((abs((1-y(x))*y(x)*(1-a*y(x))))/(abs((1-x)*x*(1-a*x))))=0:
dsolve(%,y(x));
```

$$\int^{y(x)} e^{\frac{1}{2}\frac{\mathrm{signum}(-\_a^2+a\_a^3+\_a-a\_a^2)\left(\begin{cases} -\ln(-1+a\_a)-\ln(\_a-1)-\ln(\_a) & \_a<0 \\ \textit{undefined} & \_a=0 \\ \ln(\_a-1)+\ln(\_a)+\ln(-1+a\_a) & \_a<1 \\ \textit{undefined} & \_a=1 \\ -\ln(-1+a\_a)-\ln(\_a-1)-\ln(\_a) & 1<\_a \end{cases}\right)}{\mathrm{signum}(-1+a\_a)}}\, d\_a + \int^{x} \left(-\sqrt{\left|\frac{(-1+y(x))\,y(x)\,(-1+a\,y(x))}{(\_a-1)\,\_a\,(-1+a\_a)}\right|}\; e^{\frac{1}{2}\frac{1}{\mathrm{signum}(-1+a\,y(x))}\left(\mathrm{signum}(-y(x)^2+a\,y(x)^3+y(x)-a\,y(x)^2)\left(\begin{cases} -\ln(-1+a\,y(x))-\ln(-1+y(x))-\ln(y(x)) & y(x)<0 \\ \textit{undefined} & y(x)=0 \\ \ln(-1+y(x))+\ln(y(x))+\ln(-1+a\,y(x)) & y(x)<1 \\ \textit{undefined} & y(x)=1 \\ -\ln(-1+a\,y(x))-\ln(-1+y(x))-\ln(y(x)) & 1<y(x) \end{cases}\right)\right)} \right) d\_a + \_C1 = 0$$

=

Mathematica

```
Clear["Global`*"];
ode66=D[y[x],x]-Abs[y[x]*(1-y[x])*(1-a*y[x])]^(1/2)/Abs[x*(1-x)*(1-a*x)]^(1/2)==0
DSolve[%,y[x],x]//TraditionalForm
```

No answer after 10 minutes wait. Abort

Out[5]= $-\frac{\sqrt{\text{Abs}[(1-y[x])\,y[x]\,(1-a\,y[x])]}}{\sqrt{\text{Abs}[(1-x)\,x\,(1-a\,x)]}} + y'[x] == 0$

#67

$$y'(x) - \sqrt{\frac{1+y(x)^4}{1+x^4}} = 0$$

Maple

```
restart;
ode67:=diff(y(x),x)-sqrt((1-y(x)^4)/(1-x^4))=0:
dsolve(%,y(x));
```

$$-\frac{\mathrm{I}\,\mathrm{EllipticF}(\mathrm{I}\,y(x),\mathrm{I})\sqrt{1-y(x)^2}\,\sqrt{y(x)+1}\,\sqrt{y(x)-1}}{-1+y(x)^2}+\int^{x}\left(-\frac{\sqrt{\frac{-1+y(x)^4}{-1+\_a^4}}}{\sqrt{y(x)-1}\,\sqrt{y(x)+1}\,\sqrt{y(x)^2+1}}\right)\mathrm{d}\_a+\_C1=0$$

Mathematica

```
Clear["Global`*"];
ode67 = D[y[x], x] - (1 - y[x]^4)^(1/2)/(1 - x^4)^(1/2) == 0
DSolve[%, y[x], x] // TraditionalForm
```

$$\{\{y(x)\to \mathrm{sn}(c_1+F(\sin^{-1}(x)\,|\,-1)\,|\,-1)\}\}$$

#68

$$y'(x)-\sqrt{\frac{1+by(x)^2+ay(x)^4}{1+bx^2+ax^4}}=0$$

Maple

```
restart;
ode68:=diff(y(x),x)-sqrt((1+b*y(x)^2+a*y(x)^4)/(1+b*x^2+a*x^4))=0:
dsolve(%,y(x));
```

$$\int^{y(x)}\frac{1}{\sqrt{1+b\_a^2+a\_a^4}}d\_a+\int^{x}\left(-\frac{\sqrt{\frac{1+by(x)^2+ay(x)^4}{1+b\_a^2+a\_a^4}}}{\sqrt{1+by(x)^2+ay(x)^4}}\right)d\_a+\_C1=0$$

Mathematica

```
Clear["Global`*"];
ode68 = D[y[x],x]-((a*y[x]^4 + b*y[x]^2 + 1)/(a*x^4 + b*x^2 + 1))^(1/2) == 0
DSolve[%, y[x], x] // TraditionalForm
```

$$\Bigg\{\Bigg\{y(x)\to \text{InverseFunction}\left[-\frac{i\sqrt{\frac{2\#1^2a+\sqrt{b^2-4a}+b}{\sqrt{b^2-4a}+b}}\sqrt{\frac{2\#1^2a}{b-\sqrt{b^2-4a}}+1}\,F\left(i\sinh^{-1}\left(\sqrt{2}\sqrt{\frac{a}{b+\sqrt{b^2-4a}}}\#1\right)\middle|\frac{b+\sqrt{b^2-4a}}{b-\sqrt{b^2-4a}}\right)}{\sqrt{2}\sqrt{\frac{a}{\sqrt{b^2-4a}+b}}\sqrt{\#1^4a+\#1^2b+1}}\&\right]\left[c_1-\frac{i\sqrt{\frac{\sqrt{b^2-4a}+2ax^2+b}{\sqrt{b^2-4a}+b}}\sqrt{\frac{2ax^2}{b-\sqrt{b^2-4a}}+1}\,F\left(i\sinh^{-1}\left(\sqrt{2}\sqrt{\frac{a}{b+\sqrt{b^2-4a}}}x\right)\middle|\frac{b+\sqrt{b^2-4a}}{b-\sqrt{b^2-4a}}\right)}{\sqrt{2}\sqrt{\frac{a}{\sqrt{b^2-4a}+b}}\sqrt{ax^4+bx^2+1}}\right]\Bigg\}\Bigg\}$$

#69

$$y'(x)-\sqrt{\left(a_0+a_1x+a_2x^2+a_3x^3+a_4x^4\right)\left(b_0+b_1y(x)+b_2y(x)^2+b_3y(x)^3+b_4y(x)^4\right)}=0$$

Maple

```
restart;
ode69:=diff(y(x),x)-sqrt((a0+a1*x+a2*x^2+a3*x^3+a4*x^4)*(b0+b1*y(x)+b2*y(x)^2+b3*y(x
dsolve(%,y(x));
```

$$\int^{y(x)}\frac{1}{\sqrt{b0+b1\,\_a+b2\,\_a^2+b3\,\_a^3+b4\,\_a^4}}\,d\_a+\int^{x}\Bigg(-\left(\left(a0+\_a\,a1+a2\,\_a^2+a3\,\_a^3+a4\,\_a^4\right)\left(b0+b1\,y(x)+b2\,y(x)^2+b3\,y(x)^3+b4\,y(x)^4\right)\right)^{1/2}\Big/\sqrt{b0+b1\,y(x)+b2\,y(x)^2+b3\,y(x)^3+b4\,y(x)^4}\Bigg)\,d\_a+\_C1=0$$

Mathematica

```
Clear["Global`*"];
ode69=D[y[x],x]-((b4*y[x]^4+b3*y[x]^3+b2*y[x]^2+b1*y[x]+b0)*
        (a4*x^4+a3*x^3+a2*x^2+a1*x+a0))^(1/2)==0
DSolve[%,y[x],x]//TraditionalForm
```

[illegible]

#70

$$y'(x) - \sqrt{\frac{a_0+a_1x+a_2x^2+a_3x^3+a_4x^4}{b_0+b_1y(x)+b_2y(x)^2+b_3y(x)^3+b_4y(x)^4}} = 0$$

Maple

```
restart;
ode70:=diff(y(x),x)-sqrt((a0+a1*x+a2*x^2+a3*x^3+a4*x^4)/(b0+b1*y(x)+b2*y(x)^2+b3*y(x
dsolve(%,y(x));
```

$$\int^{y(x)} \sqrt{b0 + b1\ \_a + b2\ \_a^2 + b3\ \_a^3 + b4\ \_a^4}\, d\_a + \int^{x} \left(-\sqrt{\frac{a0 + \_a\ a1 + a2\ \_a^2 + a3\ \_a^3 + a4\ \_a^4}{b0 + b1\ y(x) + b2\ y(x)^2 + b3\ y(x)^3 + b4\ y(x)^4}} \sqrt{b0 + b1\ y(x) + b2\ y(x)^2 + b3\ y(x)^3 + b4\ y(x)^4} \right) d\_a + \_C1 = 0$$

Mathematica

```
Clear["Global`*"];
ode70=D[y[x],x]-((a4*x^4 + a3*x^3 + a2*x^2 + a1*x + a0)/(b4*y[x]^4 +
        b3*y[x]^3 + b2*y[x]^2 + b1*y[x] + b0))^(1/2) == 0
DSolve[%, y[x], x] // TraditionalForm
```

#71

$$y'(x)-\sqrt{\frac{b_0+b_1y(x)+b_2y(x)^2+b_3y(x)^3+b_4y(x)^4}{a_0+a_1x+a_2x^2+a_3x^3+a_4x^4}}=0$$

Maple

```
restart;
ode71:=diff(y(x),x)-sqrt((b0+b1*y(x)+b2*y(x)^2+b3*y(x)^3+b4*y(x)^4)/(a0+a1*x+a2*x^2+a
dsolve(%,y(x));
```

$$\int^{y(x)}\frac{1}{\sqrt{b0+b1\,\_a+b2\,\_a^2+b3\,\_a^3+b4\,\_a^4}}\,d\_a+\int^{x}\left(-\frac{\sqrt{\frac{b0+b1\,y(x)+b2\,y(x)^2+b3\,y(x)^3+b4\,y(x)^4}{a0+a1\,\_a+a2\,\_a^2+a3\,\_a^3+a4\,\_a^4}}}{\sqrt{b0+b1\,y(x)+b2\,y(x)^2+b3\,y(x)^3+b4\,y(x)^4}}\right)d\_a+\_C1=0$$

Mathematica

```
Clear["Global`*"];
ode71 = D[y[x],x] - ((b4*y[x]^4 + b3*y[x]^3 + b2*y[x]^2 + b1*y[x] + b0)/(a4*x^4 +
        a3*x^3 + a2*x^2 + a1*x + a0))^(1/2) == 0
DSolve[%, y[x], x] // TraditionalForm
```

```
Solve[
 -(2 F(sin^-1(√(((Root[b4 #1^4 + b3 #1^3 + b2 #1^2 + b1 #1 + b0 &, 2] - Root[b4 #1^4 + b3 #1^3 + b2 #1^2 + b1 #1 + b0 &, 4])
        (y(x) - Root[b4 #1^4 + b3 #1^3 + b2 #1^2 + b1 #1 + b0 &, 1]))/
       ((Root[b4 #1^4 + b3 #1^3 + b2 #1^2 + b1 #1 + b0 &, 1] - Root[b4 #1^4 + b3 #1^3 + b2 #1^2 +
            b1 #1 + b0 &, 4]) (y(x) - Root[b4 #1^4 + b3 #1^3 + b2 #1^2 + b1 #1 + b0 &, 2])))) |
     ((Root[b4 #1^4 + b3 #1^3 + b2 #1^2 + b1 #1 + b0 &, 2] - Root[b4 #1^4 + b3 #1^3 + b2 #1^2 + b1 #1 + b0 &, 3])
        (Root[b4 #1^4 + b3 #1^3 + b2 #1^2 + b1 #1 + b0 &, 1] -
          Root[b4 #1^4 + b3 #1^3 + b2 #1^2 + b1 #1 + b0 &, 4]))/
      ((Root[b4 #1^4 + b3 #1^3 + b2 #1^2 + b1 #1 + b0 &, 1] - Root[b4 #1^4 + b3 #1^3 + b2 #1^2 + b1 #1 + b0 &, 3])
        (Root[b4 #1^4 + b3 #1^3 + b2 #1^2 + b1 #1 + b0 &, 2] -
          Root[b4 #1^4 + b3 #1^3 + b2 #1^2 + b1 #1 + b0 &, 4])))
    (Root[b4 #1^4 + b3 #1^3 + b2 #1^2 + b1 #1 + b0 &, 1] - Root[b4 #1^4 + b3 #1^3 + b2 #1^2 + b1 #1 + b0 &, 4])
    (y(x) - Root[b4 #1^4 + b3 #1^3 + b2 #1^2 + b1 #1 + b0 &, 2])^2
    √(((Root[b4 #1^4 + b3 #1^3 + b2 #1^2 + b1 #1 + b0 &, 1] - Root[b4 #1^4 + b3 #1^3 + b2 #1^2 + b1 #1 + b0 &, 2])
        (y(x) - Root[b4 #1^4 + b3 #1^3 + b2 #1^2 + b1 #1 + b0 &, 3]))/
      ((Root[b4 #1^4 + b3 #1^3 + b2 #1^2 + b1 #1 + b0 &, 1] - Root[b4 #1^4 + b3 #1^3 + b2 #1^2 + b1 #1 + b0 &, 3])
        (y(x) - Root[b4 #1^4 + b3 #1^3 + b2 #1^2 + b1 #1 + b0 &, 2])))
    √(((Root[b4 #1^4 + b3 #1^3 + b2 #1^2 + b1 #1 + b0 &, 1] - Root[b4 #1^4 + b3 #1^3 + b2 #1^2 + b1 #1 + b0 &, 2])
        (Root[b4 #1^4 + b3 #1^3 + b2 #1^2 + b1 #1 + b0 &, 2] - Root[b4 #1^4 + b3 #1^3 + b2 #1^2 + b1 #1 + b0 &,
            4]) (y(x) - Root[b4 #1^4 + b3 #1^3 + b2 #1^2 + b1 #1 + b0 &, 1])
        (y(x) - Root[b4 #1^4 + b3 #1^3 + b2 #1^2 + b1 #1 + b0 &, 4]))/
      ((Root[b4 #1^4 + b3 #1^3 + b2 #1^2 + b1 #1 + b0 &, 1] - Root[b4 #1^4 + b3 #1^3 + b2 #1^2 + b1 #1 + b0 &,
            4])^2 (y(x) - Root[b4 #1^4 + b3 #1^3 + b2 #1^2 + b1 #1 + b0 &, 2])^2))) /
  ((Root[b4 #1^4 + b3 #1^3 + b2 #1^2 + b1 #1 + b0 &, 2] - Root[b4 #1^4 + b3 #1^3 + b2 #1^2 + b1 #1 + b0 &, 1])
    (Root[b4 #1^4 + b3 #1^3 + b2 #1^2 + b1 #1 + b0 &, 2] -
      Root[b4 #1^4 + b3 #1^3 + b2 #1^2 + b1 #1 + b0 &, 4])
    √(b0 + y(x) (b1 + y(x) (b2 + y(x) (b3 + b4 y(x)))))) =
 c1 - (2 F(sin^-1(√(((x - Root[a4 #1^4 + a3 #1^3 + a2 #1^2 + a1 #1 + a0 &, 1]) (Root[a4 #1^4 + a3 #1^3 + a2 #1^2 +
              a1 #1 + a0 &, 2] - Root[a4 #1^4 + a3 #1^3 + a2 #1^2 + a1 #1 + a0 &, 4]))/
       ((x - Root[a4 #1^4 + a3 #1^3 + a2 #1^2 + a1 #1 + a0 &, 2]) (Root[a4 #1^4 + a3 #1^3 +
              a2 #1^2 + a1 #1 + a0 &, 1] - Root[a4 #1^4 + a3 #1^3 + a2 #1^2 + a1 #1 + a0 &, 4])))) |
     ((Root[a4 #1^4 + a3 #1^3 + a2 #1^2 + a1 #1 + a0 &, 2] - Root[a4 #1^4 + a3 #1^3 + a2 #1^2 + a1 #1 + a0 &, 3])
        (Root[a4 #1^4 + a3 #1^3 + a2 #1^2 + a1 #1 + a0 &, 1] -
          Root[a4 #1^4 + a3 #1^3 + a2 #1^2 + a1 #1 + a0 &, 4]))/
      ((Root[a4 #1^4 + a3 #1^3 + a2 #1^2 + a1 #1 + a0 &, 1] - Root[a4 #1^4 + a3 #1^3 + a2 #1^2 + a1 #1 + a0 &, 3])
        (Root[a4 #1^4 + a3 #1^3 + a2 #1^2 + a1 #1 + a0 &, 2] - Root[a4 #1^4 + a3 #1^3 + a2 #1^2 + a1 #1 + a0 &,
            4]))) (x - Root[a4 #1^4 + a3 #1^3 + a2 #1^2 + a1 #1 + a0 &, 2])^2
    √(((Root[a4 #1^4 + a3 #1^3 + a2 #1^2 + a1 #1 + a0 &, 1] - Root[a4 #1^4 + a3 #1^3 + a2 #1^2 + a1 #1 + a0 &, 2])
        (x - Root[a4 #1^4 + a3 #1^3 + a2 #1^2 + a1 #1 + a0 &, 3]))/
      ((x - Root[a4 #1^4 + a3 #1^3 + a2 #1^2 + a1 #1 + a0 &, 2]) (Root[a4 #1^4 + a3 #1^3 + a2 #1^2 + a1 #1 + a0 &,
            1] - Root[a4 #1^4 + a3 #1^3 + a2 #1^2 + a1 #1 + a0 &, 3])))
    (Root[a4 #1^4 + a3 #1^3 + a2 #1^2 + a1 #1 + a0 &, 1] - Root[a4 #1^4 + a3 #1^3 + a2 #1^2 + a1 #1 + a0 &, 4])
    √(((x - Root[a4 #1^4 + a3 #1^3 + a2 #1^2 + a1 #1 + a0 &, 1]) (Root[a4 #1^4 + a3 #1^3 + a2 #1^2 + a1 #1 + a0 &, 1] -
          Root[a4 #1^4 + a3 #1^3 + a2 #1^2 + a1 #1 + a0 &, 2])
        (x - Root[a4 #1^4 + a3 #1^3 + a2 #1^2 + a1 #1 + a0 &, 4]) (Root[a4 #1^4 + a3 #1^3 + a2 #1^2 +
              a1 #1 + a0 &, 2] - Root[a4 #1^4 + a3 #1^3 + a2 #1^2 + a1 #1 + a0 &, 4]))/
```

#72

$$y'(x) - R_1\left(x, \sqrt{a_0 + a_1 x + a_2 x^2 + a_3 x^3 + a_4 x^4}\right) R_2\left(y(x), \sqrt{b_0 + b_1 y(x) + b_2 y(x)^2 + b_3 y(x)^3 + b_4 y(x)^4}\right) = 0$$

Maple

```
restart;
ode72:=diff(y(x),x)-R1(x,sqrt(a0+a1*x+a2*x^2+a3*x^3+a4*x^4))*
R2(y(x),sqrt(b0+b1*y(x)+b2*y(x)^2+b3*y(x)^3+b4*y(x)^4))=0:
dsolve(%,y(x));
```

$$\int R1\left(x, \sqrt{a0 + a1\, x + a2\, x^2 + a3\, x^3 + a4\, x^4}\right) dx - \left(\int^{y(x)} \frac{1}{R2\left(\_a, \sqrt{b0 + b1\, \_a + b2\, \_a^2 + b3\, \_a^3 + b4\, \_a^4}\right)} d\_a \right) + \_C1 = 0$$

Mathematica

```
Clear["Global`*"];
ode72 = D[y[x], x] -R1[x, (a4*x^4 + a3*x^3 + a2*x^2 + a1*x + a0)^(1/2)]*
    R2[y[x], (b4*y[x]^4 + b3*y[x]^3 + b2*y[x]^2 + b1*y[x] + b0)^(1/2)] == 0
DSolve[%, y[x], x] // TraditionalForm
```

$$\left\{\left\{y(x) \to \text{InverseFunction}\left[\int_1^{\#1} \frac{1}{\text{R2}\left(K[1], \sqrt{\text{b1}\, K[1] + \text{b2}\, K[1]^2 + \text{b3}\, K[1]^3 + \text{b4}\, K[1]^4 + \text{b0}}\right)} dK[1]\ \&\right]\left[\int_1^x \text{R1}\left(K[2], \sqrt{\text{a1}\, K[2] + \text{a2}\, K[2]^2 + \text{a3}\, K[2]^3 + \text{a4}\, K[2]^4 + \text{a0}}\right) dK[2] + c_1\right]\right\}\right\}$$

#73

$$y'(x) - \left(\frac{a_0+a_1x+a_2x^2+a_3x^3+a_4x^4}{a_0+a_1y(x)+a_2y(x)^2+a_3y(x)^3}\right)^{\frac{2}{3}} = 0$$

Maple

```
restart;
ode73:=diff(y(x),x)-((a0+a1*x+a2*x^2+a3*x^3)/(a0+a1*y(x)+a2*y(x)^2+a3*y(x)^3))^(2/3)=
dsolve(%,y(x));
```

$$\int^{y(x)} \left(a0 + \_a\, a1 + a2\, \_a^2 + a3\, \_a^3\right)^{2/3} d\_a + \int^{x} \left(-\left(\frac{a0 + \_a\, a1 + a2\, \_a^2 + a3\, \_a^3}{a0 + a1\, y(x) + a2\, y(x)^2 + a3\, y(x)^3}\right)^{2/3} \left(a0 + a1\, y(x) + a2\, y(x)^2 + a3\, y(x)^3\right)^{2/3} \right) d\_a + \_C1 = 0$$

Mathematica

```
Clear["Global`*"];
ode73=D[y[x],x]-((a3*x^3+a2*x^2+a1*x+a0)/(a3*y[x]^3+a2*y[x]^2+a1*y[x]+a0))^(2/3)==0
DSolve[%,y[x],x]//TraditionalForm
```

$$\text{Solve}\Bigg[\Bigg(3\,(a0 + y(x)\,(a1 + y(x)\,(a2 + a3\, y(x))))^{2/3}\,(y(x) - \text{Root}[\#1^3\, a3 + \#1^2\, a2 + \#1\, a1 + a0\,\&, 1])$$
$$F_1\left(\frac{5}{3}; -\frac{2}{3}, -\frac{2}{3}; \frac{8}{3}; \frac{\text{Root}[a3\,\#1^3 + a2\,\#1^2 + a1\,\#1 + a0\,\&, 1] - y(x)}{\text{Root}[a3\,\#1^3 + a2\,\#1^2 + a1\,\#1 + a0\,\&, 1] - \text{Root}[a3\,\#1^3 + a2\,\#1^2 + a1\,\#1 + a0\,\&, 2]}, \frac{\text{Root}[a3\,\#1^3 + a2\,\#1^2 + a1\,\#1 + a0\,\&, 1] - y(x)}{\text{Root}[a3\,\#1^3 + a2\,\#1^2 + a1\,\#1 + a0\,\&, 1] - \text{Root}[a3\,\#1^3 + a2\,\#1^2 + a1\,\#1 + a0\,\&, 3]}\right)\Bigg) \Bigg/$$
$$\left(5\left(\frac{y(x) - \text{Root}[\#1^3\, a3 + \#1^2\, a2 + \#1\, a1 + a0\,\&, 2]}{\text{Root}[\#1^3\, a3 + \#1^2\, a2 + \#1\, a1 + a0\,\&, 1] - \text{Root}[\#1^3\, a3 + \#1^2\, a2 + \#1\, a1 + a0\,\&, 2]}\right)^{2/3} \left(\frac{y(x) - \text{Root}[\#1^3\, a3 + \#1^2\, a2 + \#1\, a1 + a0\,\&, 3]}{\text{Root}[\#1^3\, a3 + \#1^2\, a2 + \#1\, a1 + a0\,\&, 1] - \text{Root}[\#1^3\, a3 + \#1^2\, a2 + \#1\, a1 + a0\,\&, 3]}\right)^{2/3}\right) =$$
$$\Bigg(3\,(a0 + x\,(a1 + x\,(a2 + a3\, x)))^{2/3}\,(x - \text{Root}[\#1^3\, a3 + \#1^2\, a2 + \#1\, a1 + a0\,\&, 1])$$
$$F_1\left(\frac{5}{3}; -\frac{2}{3}, -\frac{2}{3}; \frac{8}{3}; \frac{\text{Root}[a3\,\#1^3 + a2\,\#1^2 + a1\,\#1 + a0\,\&, 1] - x}{\text{Root}[a3\,\#1^3 + a2\,\#1^2 + a1\,\#1 + a0\,\&, 1] - \text{Root}[a3\,\#1^3 + a2\,\#1^2 + a1\,\#1 + a0\,\&, 2]}, \frac{\text{Root}[a3\,\#1^3 + a2\,\#1^2 + a1\,\#1 + a0\,\&, 1] - x}{\text{Root}[a3\,\#1^3 + a2\,\#1^2 + a1\,\#1 + a0\,\&, 1] - \text{Root}[a3\,\#1^3 + a2\,\#1^2 + a1\,\#1 + a0\,\&, 3]}\right)\Bigg) \Bigg/$$
$$\left(5\left(\frac{x - \text{Root}[\#1^3\, a3 + \#1^2\, a2 + \#1\, a1 + a0\,\&, 2]}{\text{Root}[\#1^3\, a3 + \#1^2\, a2 + \#1\, a1 + a0\,\&, 1] - \text{Root}[\#1^3\, a3 + \#1^2\, a2 + \#1\, a1 + a0\,\&, 2]}\right)^{2/3}\right.$$

#74

$y'(x) - f(x)\sqrt{(y(x)-a)(y(x)-b)}(y(x)-g(x)) = 0$

Maple

```
restart;
ode74:=diff(y(x),x)-f(x)*sqrt((-a*y(x))*(-b*y(x)))*(y(x)-g(x))=0;
dsolve(%,y(x));
```

Not solved

```
> restart;
  ode74:=diff(y(x),x)-f(x)*sqrt((-a*y(x))*(-b*y(x)))*(y(x)-g(x))=0;
  dsolve(%,y(x));
```

$$ode74 := \frac{d}{dx}y(x) - f(x)\sqrt{a\,y(x)^2\,b}\,(y(x)-g(x)) = 0$$

```
>
```

Mathematica

```
Clear["Global`*"];
ode74 = D[y[x], x]-f[x]*(y[x] - g[x])*((y[x] - a)*(y[x] - b))^(1/2) == 0
DSolve[%, y[x], x] // TraditionalForm
```

Not solved

$$\text{DSolve}\left[y'(x) - f(x)(y(x)-g(x))\sqrt{(y(x)-a)(y(x)-b)} = 0,\ y(x),\ x\right]$$

#75

$y'(x) + e^x - e^{x-y(x)} = 0$

Maple

```
restart;
ode75:=diff(y(x),x)+exp(x)-exp(x-y(x))=0;
dsolve(%,y(x));
```

$$y(x) = -e^x + \ln\left(-1 + e^{e^x + \_C1}\right) - \_C1$$

Mathematica

```
Clear["Global`*"];
ode75=D[y[x],x]-Exp[x-y[x]]+Exp[x]==0
DSolve[%,y[x],x]//TraditionalForm
```

Solve::ifun : Inverse functions are being used by Solve, so some solutions may not be found; use Reduce for complete solution information. ≫

$$\left\{\left\{y(x) \to \log\left(1 - e^{c_1 - e^x}\right)\right\}\right\}$$

#76

$y'(x) - b + a * \cos(y(x)) = 0$

Maple

```
restart;
ode76:=diff(y(x),x)+b-a*cos(y(x))=0:
dsolve(%,y(x));
```

$$y(x) = 2\arctan\left(\frac{\tanh\left(\frac{1}{2}x\sqrt{-b^2+a^2}+\frac{1}{2}\_C1\sqrt{-b^2+a^2}\right)\sqrt{-b^2+a^2}}{b+a}\right)$$

Mathematica

```
Clear["Global`*"];
ode76 = D[y[x], x] - a*Cos[y[x]] + b == 0
DSolve[%, y[x], x] // TraditionalForm
```

Solve::incnst : Inconsistent or redundant transcendental equation.

After reduction, the bad equation is $\frac{(a+b)\left(-\frac{1}{a+b}+\frac{a}{(a-b)(a+b)}-\frac{b}{(a-b)(a+b)}\right)\mathrm{Tan}\left[\frac{y[x]}{2}\right]}{\sqrt{(a-b)(a+b)}} == 0.$ ≫

Solve::ifun :

Inverse functions are being used by Solve, so some solutions may not be found; use Reduce for complete solutio

$\{\{y(x) \to$

$$2\tan^{-1}\left(\frac{a\tanh\left(\frac{1}{2}\left(x\sqrt{(a-b)(a+b)}-c_1\sqrt{(a-b)(a+b)}\right)\right)}{\sqrt{(a-b)(a+b)}} - \frac{b\tanh\left(\frac{1}{2}\left(x\sqrt{(a-b)(a+b)}-c_1\sqrt{(a\right.\right.}{\sqrt{(a-b)(a+b)}}\right.$$

#77

$y'(x) - \cos(bx + ay(x)) = 0$

Maple

```
restart;
ode77:=diff(y(x),x)-cos(b*x+a*y(x))=0:
dsolve(%,y(x));
```

$$y(x) = -\frac{b\,x + 2\arctan\left(\frac{\tanh\left(-\frac{1}{2}x\sqrt{-b^2+a^2}+\frac{1}{2}\_C1\sqrt{-b^2+a^2}\right)\sqrt{-b^2+a^2}}{-b+a}\right)}{a}$$

Mathematica

```
Clear["Global`*"];
ode77 = D[y[x], x] - Cos[a*y[x] + b*x] == 0
DSolve[%, y[x], x] // TraditionalForm
```

Solve::incnst : Inconsistent or redundant transcendental equation. After reduction, the bad equation is $\frac{(-a+b)\left(\frac{1}{a-b}-\frac{a}{(a-b)(a+b)}-\frac{b}{(a-b)(a+b)}\right)\text{Tan}\left[\frac{1}{2}(b\,x+a\,y[x])\right]}{\sqrt{(a-b)(a+b)}} == 0.$ ≫

Solve::ifun :
Inverse functions are being used by Solve, so some solutions may not be found; use Reduce for complete solutio

$$\left\{\left\{y(x)\to\frac{-2\tan^{-1}\left(\frac{a\tanh\left(\frac{1}{2}\left(c_1\sqrt{a^2-b^2}-x\sqrt{a^2-b^2}\right)\right)}{\sqrt{a^2-b^2}}+\frac{b\tanh\left(\frac{1}{2}\left(c_1\sqrt{a^2-b^2}-x\sqrt{a^2-b^2}\right)\right)}{\sqrt{a^2-b^2}}\right)-b\,x}{a}\right\}\right\}$$

#78

$y'(x)+a\sin\left(\alpha y(x)+\beta x\right)+b=0$

Maple

```
restart;
ode78:=diff(y(x),x)+a* sin(alpha *y(x)+ beta*x)+b=0:
dsolve(%,y(x));
```

$$y(x)=\frac{1}{\alpha}\left(-\beta x+2\arctan\left(\frac{1}{-\beta+b\alpha}\left(\tan\left(-\frac{1}{2}x\sqrt{\beta^2-2\beta b\alpha+b^2\alpha^2-a^2\alpha^2}+\frac{1}{2}\_C1\sqrt{\beta^2-2\beta b\alpha+b^2\alpha^2-a^2\alpha^2}\right)\sqrt{\beta^2-2\beta b\alpha+b^2\alpha^2-a^2\alpha^2}-a\alpha\right)\right)\right)$$

Mathematica

```
Clear["Global`*"];
ode78=D[y[x],x]+a*Sin[\[Alpha] y[x]+\[Beta]*x]+b==0
DSolve[%,y[x],x]//TraditionalForm
```

Solve::ifun : Inverse functions are being used by Solve, so some solutions may not be found; use Reduce for complete solution information. ≫

$$\begin{aligned}\Bigg\{\Bigg\{y(x)\to\frac{1}{\alpha}\Bigg(2\tan^{-1}\Bigg(1/(b\alpha-\beta)\Bigg(\Bigg(a^2\sqrt{-(a\alpha+b\alpha-\beta)(a\alpha-b\alpha+\beta)}\\
\tan\left(\frac{1}{2}\left(-\frac{a^2c_1\alpha^2}{\sqrt{-(a\alpha+b\alpha-\beta)(a\alpha-b\alpha+\beta)}}+\frac{b^2c_1\alpha^2}{\sqrt{-(a\alpha+b\alpha-\beta)(a\alpha-b\alpha+\beta)}}+\frac{a^2x\alpha^2}{\sqrt{-(a\alpha+b\alpha-\beta)(a\alpha-b\alpha+\beta)}}-\right.\right.\\
\frac{b^2x\alpha^2}{\sqrt{-(a\alpha+b\alpha-\beta)(a\alpha-b\alpha+\beta)}}-\frac{2b\beta c_1\alpha}{\sqrt{-(a\alpha+b\alpha-\beta)(a\alpha-b\alpha+\beta)}}+\frac{2bx\beta\alpha}{\sqrt{-(a\alpha+b\alpha-\beta)(a\alpha-b\alpha+\beta)}}+\\
\left.\left.\frac{\beta^2c_1}{\sqrt{-(a\alpha+b\alpha-\beta)(a\alpha-b\alpha+\beta)}}-\frac{x\beta^2}{\sqrt{-(a\alpha+b\alpha-\beta)(a\alpha-b\alpha+\beta)}}\right)\right)\alpha^2\Bigg)\Big/((a\alpha+b\alpha-\beta)(a\alpha-b\alpha+\beta))-\\
\Bigg(b^2\sqrt{-(a\alpha+b\alpha-\beta)(a\alpha-b\alpha+\beta)}\tan\left(\frac{1}{2}\left(-\frac{a^2c_1\alpha^2}{\sqrt{-(a\alpha+b\alpha-\beta)(a\alpha-b\alpha+\beta)}}+\frac{b^2c_1\alpha^2}{\sqrt{-(a\alpha+b\alpha-\beta)(a\alpha-b\alpha+\beta)}}+\right.\right.\\
\frac{a^2x\alpha^2}{\sqrt{-(a\alpha+b\alpha-\beta)(a\alpha-b\alpha+\beta)}}-\frac{b^2x\alpha^2}{\sqrt{-(a\alpha+b\alpha-\beta)(a\alpha-b\alpha+\beta)}}-\frac{2b\beta c_1\alpha}{\sqrt{-(a\alpha+b\alpha-\beta)(a\alpha-b\alpha+\beta)}}+\\
\left.\left.\frac{2bx\beta\alpha}{\sqrt{-(a\alpha+b\alpha-\beta)(a\alpha-b\alpha+\beta)}}+\frac{\beta^2c_1}{\sqrt{-(a\alpha+b\alpha-\beta)(a\alpha-b\alpha+\beta)}}-\frac{x\beta^2}{\sqrt{-(a\alpha+b\alpha-\beta)(a\alpha-b\alpha+\beta)}}\right)\right)\alpha^2\Bigg)\Big/\\
((a\alpha+b\alpha-\beta)(a\alpha-b\alpha+\beta))-a\alpha+\Bigg(2b\beta\sqrt{-(a\alpha+b\alpha-\beta)(a\alpha-b\alpha+\beta)}\tan\left(\frac{1}{2}\left(-\frac{a^2c_1\alpha^2}{\sqrt{-(a\alpha+b\alpha-\beta)(a\alpha-b\alpha+\beta)}}+\right.\right.\\
\frac{b^2c_1\alpha^2}{\sqrt{-(a\alpha+b\alpha-\beta)(a\alpha-b\alpha+\beta)}}+\frac{a^2x\alpha^2}{\sqrt{-(a\alpha+b\alpha-\beta)(a\alpha-b\alpha+\beta)}}-\frac{b^2x\alpha^2}{\sqrt{-(a\alpha+b\alpha-\beta)(a\alpha-b\alpha+\beta)}}-\\
\frac{2b\beta c_1\alpha}{\sqrt{-(a\alpha+b\alpha-\beta)(a\alpha-b\alpha+\beta)}}+\frac{2bx\beta\alpha}{\sqrt{-(a\alpha+b\alpha-\beta)(a\alpha-b\alpha+\beta)}}+\frac{\beta^2c_1}{\sqrt{-(a\alpha+b\alpha-\beta)(a\alpha-b\alpha+\beta)}}-\\
\left.\left.\frac{x\beta^2}{\sqrt{-(a\alpha+b\alpha-\beta)(a\alpha-b\alpha+\beta)}}\right)\right)\alpha\Bigg)\Big/((a\alpha+b\alpha-\beta)(a\alpha-b\alpha+\beta))-\Bigg(\beta^2\sqrt{-(a\alpha+b\alpha-\beta)(a\alpha-b\alpha+\beta)}\\
\tan\left(\frac{1}{2}\left(-\frac{a^2c_1\alpha^2}{\sqrt{-(a\alpha+b\alpha-\beta)(a\alpha-b\alpha+\beta)}}+\frac{b^2c_1\alpha^2}{\sqrt{-(a\alpha+b\alpha-\beta)(a\alpha-b\alpha+\beta)}}+\frac{a^2x\alpha^2}{\sqrt{-(a\alpha+b\alpha-\beta)(a\alpha-b\alpha+\beta)}}-\right.\right.\\
\frac{b^2x\alpha^2}{\sqrt{-(a\alpha+b\alpha-\beta)(a\alpha-b\alpha+\beta)}}-\frac{2b\beta c_1\alpha}{\sqrt{-(a\alpha+b\alpha-\beta)(a\alpha-b\alpha+\beta)}}+\frac{2bx\beta\alpha}{\sqrt{-(a\alpha+b\alpha-\beta)(a\alpha-b\alpha+\beta)}}+\\
\left.\left.\frac{\beta^2c_1}{\sqrt{-(a\alpha+b\alpha-\beta)(a\alpha-b\alpha+\beta)}}-\frac{x\beta^2}{\sqrt{-(a\alpha+b\alpha-\beta)(a\alpha-b\alpha+\beta)}}\right)\right)\Bigg)\Big/((a\alpha+b\alpha-\beta)(a\alpha-b\alpha+\beta))\Bigg)\Bigg)-x\beta\Bigg)\Bigg\}\Bigg\}\end{aligned}$$

#79

$y'(x) + f(x)\cos(ay(x)) + g(x)\sin(ay(x)) + h(x) = 0$

Maple

```
restart;
ode79:=diff(y(x),x)+f(x)*cos(a*y(x))+g(x)*sin(a*y(x))+h(x)=0;
dsolve(%,y(x));
```

No solution

$$ode79 := \frac{d}{dx} y(x) + f(x)\cos(a\,y(x)) + g(x)\sin(a\,y(x)) + h(x) = 0$$

Mathematica

```
Clear["Global`*"];
ode79=D[y[x],x]+f[x]*Cos[a*y[x]]+g[x]*Sin[a*y[x]]+h[x]==0
DSolve[%,y[x],x]//TraditionalForm
```

No solution

Solve::ifun : Inverse functions are being used by Solve, so some solutions may not be found; use Reduce for complete solution information. ≫

$$\text{DSolve}[f(x)\cos(a\,y(x)) + g(x)\sin(a\,y(x)) + h(x) + y'(x) = 0,\ y(x),\ x]$$

#80

$y'(x) + f(x)\sin(y(x)) + (1 - f'(x))\cos(y(x)) - f'(x) - 1 = 0$

Maple

```
restart;
ode80:=diff(y(x),x)+f(x)*sin(y(x))+(1-diff(f(x),x))*cos(y(x))-diff(f(x),x)-1=0;
dsolve(%,y(x));
```

$$y(x) = 2\arctan\left(\frac{-e^{\int f(x)\,dx} + \left(\int e^{\int f(x)\,dx}\,dx\right) f(x) + \_C1\, f(x)}{\_C1 + \int e^{\int f(x)\,dx}\,dx}\right)$$

Mathematica

```
Clear["Global`*"];
ode80 = D[y[x], x] + f[x]*Sin[y[x]] + (1 - D[f[x], x])*Cos[y[x]] -
   D[f[x], x] - 1 == 0
DSolve[%, y[x], x] // TraditionalForm
```

No solution

Solve::ifun : Inverse functions are being used by Solve,
so some solutions may not be found; use Reduce for complete solution information. ≫

$\text{DSolve}[(1 - f'(x))\cos(y(x)) - f'(x) + f(x)\sin(y(x)) + y'(x) - 1 = 0,\ y(x),\ x]$

#81

$y'(x) + 2\tan(y(x))\tan(x) - 1 = 0$

Maple

```
restart;
ode81:=diff(y(x),x)+2*tan(y(x))*tan(x)-1=0;
dsolve(%,y(x));
```

$$\_CI + \frac{\tan(x)}{\left(\frac{(1+\tan(y(x))^2)(1+\tan(x)^2)}{(\tan(y(x))\tan(x)-1)^2}\right)^{1/4}} + \frac{1}{2}\,\frac{(\tan(y(x))+\tan(x))\,\mathrm{hypergeom}\left(\left[\frac{1}{2},\frac{5}{4}\right],\left[\frac{3}{2}\right],-\frac{(\tan(y(x))+\tan(x))^2}{(\tan(y(x))\tan(x)-1)^2}\right)}{\tan(y(x))\tan(x)-1} = 0$$

Mathematica

```
Clear["Global‘*"];
ode81 = D[y[x], x] + 2*Tan[y[x]]*Tan[x] - 1 == 0
DSolve[%, y[x], x] // TraditionalForm
```

No solution

Solve::ifun : Inverse functions are being used by Solve,
so some solutions may not be found; use Reduce for complete solution information. ≫

Solve::ifun : Inverse functions are being used by Solve,
so some solutions may not be found; use Reduce for complete solution information. ≫

$\mathrm{DSolve}[y'(x) + 2\tan(x)\tan(y(x)) - 1 = 0,\ y(x),\ x]$

#82

$y'(x) - a\left(1 + \tan(y(x))^2\right) + \tan(y(x))\tan(x) = 0$

Maple

```
restart;
ode82:=diff(y(x),x)-a*(1+tan(y(x))^2)+tan(y(x))*tan(x)=0;
dsolve(%,y(x));
```

No solution

$$ode82 := \frac{d}{dx}\, y(x) - a\left(1 + \tan(y(x))^2\right) + \tan(y(x))\tan(x) = 0$$

=

>

Mathematica

```
Clear["Global`*"];
ode82 = D[y[x], x] - a*(1 + Tan[y[x]]^2) + Tan[y[x]]*Tan[x] == 0
DSolve[%, y[x], x] // TraditionalForm
```

No solution

Solve::ifun : Inverse functions are being used by Solve,
so some solutions may not be found; use Reduce for complete solution information. ≫

Solve::ifun : Inverse functions are being used by Solve,
so some solutions may not be found; use Reduce for complete solution information. ≫

$\text{DSolve}\left[-a\left(\tan^2(y(x)) + 1\right) + y'(x) + \tan(x)\tan(y(x)) = 0,\ y(x),\ x\right]$

#83

$y'(x) - \tan(xy(x)) = 0$

Maple

```
restart;
ode83:=diff(y(x),x)-tan(x*y(x))=0;
dsolve(%,y(x));
```

$$y(x) = -\mathrm{I}\, RootOf\left(-\operatorname{erf}\left(\frac{1}{2}\,(-x+\_Z)\sqrt{2}\right)\sqrt{\pi} - \sqrt{\pi}\,\operatorname{erf}\left(\frac{1}{2}\sqrt{2}\,(x+\_Z)\right) + \sqrt{2}\,\_C1\right)$$

Mathematica

```
Clear["Global`*"];
ode83 = D[y[x], x] - Tan[x*y[x]] == 0
DSolve[%, y[x], x] // TraditionalForm
```

No solution

Solve::ifun : Inverse functions are being used by Solve,
so some solutions may not be found; use Reduce for complete solution information. ≫

Solve::ifun : Inverse functions are being used by Solve,
so some solutions may not be found; use Reduce for complete solution information. ≫

DSolve[$y'(x) - \tan(x\, y(x)) = 0,\ y(x),\ x$]

#84

$y'(x) - f(ax + by(x)) = 0$

Maple

```
restart;
ode84:=diff(y(x),x)-f(a*x+b*y(x))=0:
dsolve(%,y(x));
```

$$y(x) = \frac{-a\,x + RootOf\left(-x + \left(\int^{\_Z} \frac{1}{a + f(\_a\,b)\,b}\,d\_a\right) b + \_C1\right) b}{b}$$

Mathematica

```
Clear["Global`*"];
ode84 = D[y[x], x] - f[a*x + b*y[x]] == 0
DSolve[%, y[x], x] // TraditionalForm
```

$$\text{Solve}\left[\int_1^{y(x)} -\frac{b}{b\,f(b\,K[2] + a) + a}\,dK[2] + \int_1^x \frac{b\,f(a\,K[1] + b\,y(x))}{b\,f(a\,K[1] + b\,y(x)) + a}\,dK[1] = c_1,\ y(x)\right]$$

#85

$$y'(x) - x^{a-1} f\left(\frac{x^a}{a} + \frac{y(x)^b}{b}\right) y(x)^{1-b} = 0$$

Maple

```
restart;
ode85:=diff(y(x),x)-x^(a-1)*y(x)^(1-b)*f(x^a/a+y(x)^b/b)=0:
dsolve(%,y(x));
```

$$y(x) = \left(-\frac{1}{a}\left(-RootOf\left(-x^a b + \left(\int^{\_Z} 1 \Big/ \left(-b \left(a^{\frac{1}{a}}\right)^a \left(\left(\_a - b\right)^{\frac{1}{b}}\right)^{-b} f\left(\frac{\left(a^{\frac{1}{a}}\right)^a b + \left(\left(\_a - b\right)^{\frac{1}{b}}\right)^b a}{a\, b}\right) + a + \left(a^{\frac{1}{a}}\right)^a \left(\left(\_a - b\right)^{\frac{1}{b}}\right)^{-b} f\left(\frac{\left(a^{\frac{1}{a}}\right)^a b + \left(\left(\_a - b\right)^{\frac{1}{b}}\right)^b a}{a\, b}\right) \_a\right) d\_a\right) a^2 + \_C1\, a\, b\right) a + x^a b\right)\right)^{\frac{1}{b}}$$

Mathematica

```
Clear["Global`*"];
ode85 = D[y[x], x] - x^(a - 1)*y[x]^(1 - b)*f[x^a/a + y[x]^b/b] == 0
DSolve[%, y[x], x] // TraditionalForm
```

$$\text{Solve}\left[\int_1^{y(x)}\left(-\int_1^x\left(\frac{K[1]^{a-1} K[2]^{b-1} f'\left(\frac{K[1]^a}{a}+\frac{K[2]^b}{b}\right)}{f\left(\frac{K[1]^a}{a}+\frac{K[2]^b}{b}\right)+1} - \frac{K[1]^{a-1} K[2]^{b-1} f\left(\frac{K[1]^a}{a}+\frac{K[2]^b}{b}\right) f'\left(\frac{K[1]^a}{a}+\frac{K[2]^b}{b}\right)}{\left(f\left(\frac{K[1]^a}{a}+\frac{K[2]^b}{b}\right)+1\right)^2} \cdots \right. \frac{K[2]^{b-1}}{f\left(\frac{K[2]^b}{b}+\frac{x^a}{a}\right)+1}\right) dK[2] + \int_1^x \frac{K[1]^{a-1} f\left(\frac{K[1]^a}{a}+\frac{y(x)^b}{b}\right)}{f\left(\frac{K[1]^a}{a}+\frac{y(x)^b}{b}\right)+1} dK[1] = c_1, y(x)\right]$$

#86

$$y'(x) - \frac{y(x) - x f\left(x^2 + a y(x)^2\right)}{x + a f\left(x^2 + a y(x)^2\right) y(x)} = 0$$

Maple

```
restart;
ode86:=diff(y(x),x)-((-x*f(x^2+a*y(x)^2)+y(x))/(x+a*f(x^2+a*y(x)^2)*y(x)))=0;
dsolve(%,y(x));
```

$$\sqrt{a}\,\arctan\left(\frac{\sqrt{a}\,x}{\sqrt{a^2 y(x)^2}}\right) - \frac{1}{2}\left(\int^{\frac{x^2}{a} + y(x)^2} \frac{f(\_a\,a)}{\_a}\,\mathrm{d}\_a\right) a - \_C1 = 0$$

Mathematica

```
Clear["Global`*"];
ode86 = D[y[x],x]-(y[x]-x*f[x^2 + a*y[x]^2])/(x+a*y[x]*f[x^2+a*y[x]^2])==0
DSolve[%, y[x], x] // TraditionalForm
```

$$\text{Solve}\left[\int_1^{y(x)} \frac{a^2 K[2]\left(-f\left(a K[2]^2 + 1\right)\right) - a}{a K[2]^2 + 1}\,dK[2] + \int_1^x \frac{a\,y(x) - a K[1]\,f\left(K[1]^2 + a\,y(x)^2\right)}{K[1]^2 + a\,y(x)^2}\,dK[1] = c_1,\ y(x)\right]$$

#87

$$y'(x) - \frac{af(x^c y(x))y(x) + cx^a y(x)^b}{bxf(x^c y(x)) - x^a y(x)^b} = 0$$

Maple

```
restart;
ode87:=diff(y(x),x)-((a*f(x^c*y(x))*y(x)+c*x^a*y(x)^b)/(b*x*f(x^c*y(x))-x^a*y(x)^b))=
dsolve(%,y(x));
```

no solution

$$ode87 := \frac{d}{dx} y(x) - \frac{a f\left(x^c y(x)\right) y(x) + c x^a y(x)^b}{b x f\left(x^c y(x)\right) - x^a y(x)^b} = 0$$

>

Mathematica

```
Clear["Global‘*"];
ode87 = D[y[x],x]-(y[x]*a*f[x^c*y[x]]+c*x^a*y[x]^b)/(x*b*f[x^c*y[x]]-x^a*y[x]^b)== 0
DSolve[%, y[x], x] // TraditionalForm
```

no solution

$$\text{DSolve}\left[y'(x) - \frac{c x^a y(x)^b + a y(x) f(x^c y(x))}{b x f(x^c y(x)) - x^a y(x)^b} = 0, y(x), x\right]$$

#88

$2y'(x) - b - ce^{-2ax} - 4ay(x) - 3y(x)^2 = 0$

Maple

```
restart;
ode88:=2*diff(y(x),x)-b-c*exp(-2*a*x)-4*a*y(x)-3*y(x)^2=0;
dsolve(%,y(x));
```

$$y(x) = \left(-\frac{1}{3} \left(\_C1 \sqrt{3} \sqrt{c} \, \mathrm{BesselY}\left(-\frac{1}{2} \frac{\sqrt{4a^2 - 3b} - 2a}{a}, \frac{1}{2} \frac{\sqrt{3} \sqrt{c} \, e^{-ax}}{a} \right) \right) \middle/ \left(\_C1 \, \mathrm{BesselY}\left(-\frac{1}{2} \frac{\sqrt{4a^2 - 3b}}{a}, \frac{1}{2} \frac{\sqrt{3} \sqrt{c} \, e^{-ax}}{a} \right) + \mathrm{BesselJ}\left(-\frac{1}{2} \frac{\sqrt{4a^2 - 3b}}{a}, \frac{1}{2} \frac{\sqrt{3} \sqrt{c} \, e^{-ax}}{a} \right) \right) - \frac{1}{3} \left(\sqrt{3} \, \mathrm{BesselJ}\left(-\frac{1}{2} \frac{\sqrt{4a^2 - 3b} - 2a}{a}, \frac{1}{2} \frac{\sqrt{3} \sqrt{c} \, e^{-ax}}{a} \right) \sqrt{c} \right) \middle/ \left(\_C1 \, \mathrm{BesselY}\left(-\frac{1}{2} \frac{\sqrt{4a^2 - 3b}}{a}, \frac{1}{2} \frac{\sqrt{3} \sqrt{c} \, e^{-ax}}{a} \right) + \mathrm{BesselJ}\left(-\frac{1}{2} \frac{\sqrt{4a^2 - 3b}}{a}, \frac{1}{2} \frac{\sqrt{3} \sqrt{c} \, e^{-ax}}{a} \right) \right) \right) e^{-ax} - \frac{1}{3} \left(\left(2 \_C1 \, a + \_C1 \sqrt{4a^2 - 3b} \right) \mathrm{BesselY}\left(-\frac{1}{2} \frac{\sqrt{4a^2 - 3b}}{a}, \frac{1}{2} \frac{\sqrt{3} \sqrt{c} \, e^{-ax}}{a} \right) + \left(2a + \sqrt{4a^2 - 3b} \right) \mathrm{BesselJ}\left(-\frac{1}{2} \frac{\sqrt{4a^2 - 3b}}{a}, \frac{1}{2} \frac{\sqrt{3} \sqrt{c} \, e^{-ax}}{a} \right) \right) \middle/ \left(\_C1 \, \mathrm{BesselY}\left(-\frac{1}{2} \frac{\sqrt{4a^2 - 3b}}{a}, \frac{1}{2} \frac{\sqrt{3} \sqrt{c} \, e^{-ax}}{a} \right) + \mathrm{BesselJ}\left(-\frac{1}{2} \frac{\sqrt{4a^2 - 3b}}{a}, \frac{1}{2} \frac{\sqrt{3} \sqrt{c} \, e^{-ax}}{a} \right) \right)$$

Mathematica

```
Clear["Global`*"];
ode88 = 2*D[y[x], x] - 3*y[x]^2 - 4*a*y[x] - b - c*Exp[-2*a*x] == 0
DSolve[%, y[x], x] // TraditionalForm
```

$$\left\{\left\{y(x) \to -\left(2\left(-2^{-\frac{a\sqrt{4a^2-3b}-2a^2}{a^2}+\frac{\sqrt{4a^2-3b}}{a}+1} \, 3^{\frac{a\sqrt{4a^2-3b}-2a^2}{4a^2}-\frac{\sqrt{4a^2-3b}}{4a}} \, a^{-\frac{a\sqrt{4a^2-3b}-2a^2}{2a^2}+\frac{\sqrt{4a^2-3b}}{2a}}\right.\right.\right.\right.$$

#89

$xy'(x) - \sqrt{a^2 - x^2} = 0$

Maple

```
restart;
ode89:=x*diff(y(x),x)-sqrt(a^2-x^2)=0;
dsolve(%,y(x));
```

$$y(x) = \sqrt{a^2 - x^2} - \frac{a^2 \ln\left(\frac{2\,a^2 + 2\sqrt{a^2}\,\sqrt{a^2 - x^2}}{x}\right)}{\sqrt{a^2}} + \_C1$$

Mathematica

```
Clear["Global`*"];
ode89 = x*D[y[x], x] - (a^2 - x^2)^(1/2) == 0
DSolve[%, y[x], x] // TraditionalForm
```

$$\left\{\left\{y(x) \to \sqrt{a^2 - x^2} - a\log\left(a\sqrt{a^2 - x^2} + a^2\right) + a\log(x) + c_1\right\}\right\}$$

#90

$xy'(x) - x\sin(x) + y(x) = 0$

Maple

```
restart;
ode90:=x*diff(y(x),x)+y(x)-x*sin(x)=0:
dsolve(%,y(x));
```

$$y(x) = \frac{\sin(x) - x\cos(x) + \_C1}{x}$$

Mathematica

```
Clear["Global`*"];
ode90 = x*D[y[x], x] + y[x] - x*Sin[x] == 0
DSolve[%, y[x], x] // TraditionalForm
```

$$\left\{\left\{y(x) \to \frac{c_1}{x} + \frac{\sin(x) - x\cos(x)}{x}\right\}\right\}$$

#91

$xy'(x) - y(x) - \frac{x}{\ln(x)} = 0$

Maple

```
restart;
ode91:=x*diff(y(x),x)-y(x)-x/log(x)=0:
dsolve(%,y(x));
```

$$y(x) = (\ln(\ln(x)) + \_C1)\, x$$

Mathematica

```
Clear["Global`*"];
ode91 = x*D[y[x], x] - y[x] - x/Log[x] == 0
DSolve[%, y[x], x] // TraditionalForm
```

$$\{\{y(x) \to c_1\, x + x\log(\log(x))\}\}$$

#92

$xy'(x) - y(x) - x^2 \sin(x) = 0$

Maple

```
restart;
ode92:=x*diff(y(x),x)-y(x)-x^2*sin(x)=0:
dsolve(%,y(x));
```

$y(x) = -x\cos(x) + x\_C1$

Mathematica

```
Clear["Global`*"];
ode92 = x*D[y[x], x] - y[x] - x^2*Sin[x] == 0
DSolve[%, y[x], x] // TraditionalForm
```

$\{\{y(x) \to c_1 x - x\cos(x)\}\}$

#93

$xy'(x) - y(x) - \frac{x\cos(\ln(\ln(x)))}{\ln(x)} = 0$

Maple

```
restart;
ode93:=x*diff(y(x),x)-y(x)-(x*cos(log(log(x))))/(log(x))=0;
dsolve(%,y(x));
```

$y(x) = x\sin(\ln(\ln(x))) + x\_C1$

Mathematica

```
Clear["Global`*"];
ode93 = x*D[y[x], x] - y[x] - x*Cos[Log[Log[x]]]/Log[x] == 0
DSolve[%, y[x], x] // TraditionalForm
```

$\{\{y(x) \to c_1 x + x\sin(\log(\log(x)))\}\}$

#94

$xy'(x) + bx^n + ay(x) = 0$

Maple

```
restart;
ode94:=x*diff(y(x),x)+b*x^n+a*y(x)=0:
dsolve(%,y(x));
```

$$y(x) = -\frac{b\,x^n}{n+a} + x^{-a}\,\_C1$$

Mathematica

```
Clear["Global`*"];
ode94 = x*D[y[x], x] + a*y[x] + b*x^n == 0
DSolve[%, y[x], x] // TraditionalForm
```

$$\left\{\left\{y(x) \to c_1\,x^{-a} - \frac{b\,x^n}{a+n}\right\}\right\}$$

#95

$xy'(x) + x^2 + y(x)^2 = 0$

Maple

```
restart;
ode95:=x*diff(y(x),x)+x^2+y(x)^2=0:
dsolve(%,y(x));
```

$$y(x) = -\frac{\_C1\, x\, \mathrm{BesselY}(1, x)}{\_C1\, \mathrm{BesselY}(0, x) + \mathrm{BesselJ}(0, x)} - \frac{\mathrm{BesselJ}(1, x)\, x}{\_C1\, \mathrm{BesselY}(0, x) + \mathrm{BesselJ}(0, x)}$$

Mathematica

```
Clear["Global`*"];
ode95 = x*D[y[x], x] + y[x]^2 + x^2 == 0
DSolve[%, y[x], x] // TraditionalForm
```

$$\left\{\left\{y(x) \to \frac{x\left(-c_1\, J_1(x) - Y_1(x)\right)}{c_1\, J_0(x) + Y_0(x)}\right\}\right\}$$

#96

$xy'(x) - y(x)^2 + 1 = 0$

Maple

```
restart;
ode96:=x*diff(y(x),x)+1-y(x)^2=0:
dsolve(%,y(x));
```

$$y(x) = -\tanh(\ln(x) + \_C1)$$

Mathematica

```
Clear["Global`*"];
ode96 = x*D[y[x], x] - y[x]^2 + 1 == 0
DSolve[%, y[x], x] // TraditionalForm
```

$$\left\{\left\{y(x) \to \frac{1 - e^{2 c_1} x^2}{e^{2 c_1} x^2 + 1}\right\}\right\}$$

#97

$xy'(x) + bx^2 - y(x) + ay(x)^2 = 0$

Maple

```
restart;
ode97:=x*diff(y(x),x)+b*x^2-y(x)+a*y(x)^2=0:
dsolve(%,y(x));
```

$$y(x) = -\frac{\tan\left(x\sqrt{b\,a} + \_C1\sqrt{b\,a}\right)x\sqrt{b\,a}}{a}$$

Mathematica

```
Clear["Global`*"];
ode97 = x*D[y[x], x] + a*y[x]^2 - y[x] + b*x^2 == 0
DSolve[%, y[x], x] // TraditionalForm
```

$$\left\{\left\{y(x) \to -\frac{\sqrt{b}\,x\tan\left(\sqrt{a}\,\sqrt{b}\,x - \sqrt{a}\,\sqrt{b}\,c_1\right)}{\sqrt{a}}\right\}\right\}$$

#98

$xy'(x) + cx^{2b} - by(x) + ay(x)^2 = 0$

Maple

```
restart;
ode98:=x*diff(y(x),x)+c*x^(2*b)-b*y(x)+a*y(x)^2=0;
dsolve(%,y(x));
```

$$y(x) = -\frac{\tan\left(\frac{x^b\sqrt{a}\sqrt{c} + \_C1\, b}{b}\right)\sqrt{c}}{x^{-b}\sqrt{a}}$$

Mathematica

```
Clear["Global`*"];
ode98 = x*D[y[x], x] + a*y[x]^2 - b*y[x] + c*x^(2*b) == 0
DSolve[%, y[x], x] // TraditionalForm
```

$$\left\{\left\{y(x) \to -\left(\sqrt{-a}\,\sqrt{-c}\,x^b\left(\frac{\sqrt{\frac{2}{\pi}}\,c_1\sin\left(\frac{\sqrt{-a}\,\sqrt{-c}\,x^b}{b}\right)}{\sqrt{\frac{\sqrt{-a}\,\sqrt{-c}\,x^b}{b}}} - \frac{2\sqrt{\frac{2}{\pi}}\cos\left(\frac{\sqrt{-a}\,\sqrt{-c}\,x^b}{b}\right)}{\sqrt{\frac{\sqrt{-a}\,\sqrt{-c}\,x^b}{b}}} - \right.\right.\right.\right.$$

$$\left.\frac{\sqrt{\frac{2}{\pi}}\,c_1\left(-\sin\left(\frac{\sqrt{-a}\,\sqrt{-c}\,x^b}{b}\right) - \frac{\sqrt{-a}\,b\sqrt{-c}\,x^{-b}\cos\left(\frac{\sqrt{-a}\,\sqrt{-c}\,x^b}{b}\right)}{a\,c}\right)}{\sqrt{\frac{\sqrt{-a}\,\sqrt{-c}\,x^b}{b}}}\right) - \frac{\sqrt{\frac{2}{\pi}}\,b\,c_1\cos\left(\frac{\sqrt{-a}\,\sqrt{-c}\,x^b}{b}\right.}{\sqrt{\frac{\sqrt{-a}\,\sqrt{-c}\,x^b}{b}}}$$

$$\left.\left.\left(2\,a\left(\frac{\sqrt{\frac{2}{\pi}}\sin\left(\frac{\sqrt{-a}\,\sqrt{-c}\,x^b}{b}\right)}{\sqrt{\frac{\sqrt{-a}\,\sqrt{-c}\,x^b}{b}}} + \frac{\sqrt{\frac{2}{\pi}}\,c_1\cos\left(\frac{\sqrt{-a}\,\sqrt{-c}\,x^b}{b}\right)}{\sqrt{\frac{\sqrt{-a}\,\sqrt{-c}\,x^b}{b}}}\right)\right)\right\}\right\}$$

#99

$$xy'(x) - cx^{\beta} - by(x) + ay(x)^2 = 0$$

Maple

```
restart;
ode99:=x*diff(y(x),x)-c*x^beta-b*y(x)+a*y(x)^2=0;
dsolve(%,y(x));
```

$$y(x) = -\frac{\_C1\,\sqrt{-a\,c}\,x^{\frac{1}{2}\beta}\,\mathrm{BesselY}\left(\frac{b+\beta}{\beta}, \frac{2\sqrt{-a\,c}\,x^{\frac{1}{2}\beta}}{\beta}\right)}{a\left(\_C1\,\mathrm{BesselY}\left(\frac{b}{\beta}, \frac{2\sqrt{-a\,c}\,x^{\frac{1}{2}\beta}}{\beta}\right) + \mathrm{BesselJ}\left(\frac{b}{\beta}, \frac{2\sqrt{-a\,c}\,x^{\frac{1}{2}\beta}}{\beta}\right)\right)} - \left(-b\,\mathrm{BesselJ}\left(\frac{b}{\beta},\right.\right.$$
$$\left.\frac{2\sqrt{-a\,c}\,x^{\frac{1}{2}\beta}}{\beta}\right) + \mathrm{BesselJ}\left(\frac{b+\beta}{\beta}, \frac{2\sqrt{-a\,c}\,x^{\frac{1}{2}\beta}}{\beta}\right)\sqrt{-a\,c}\,x^{\frac{1}{2}\beta} - \_C1\,b\,\mathrm{BesselY}\left(\frac{b}{\beta},\right.$$
$$\left.\left.\frac{2\sqrt{-a\,c}\,x^{\frac{1}{2}\beta}}{\beta}\right)\right) \Bigg/ \left(a\left(\_C1\,\mathrm{BesselY}\left(\frac{b}{\beta}, \frac{2\sqrt{-a\,c}\,x^{\frac{1}{2}\beta}}{\beta}\right) + \mathrm{BesselJ}\left(\frac{b}{\beta}, \frac{2\sqrt{-a\,c}\,x^{\frac{1}{2}\beta}}{\beta}\right)\right)\right)$$

Mathematica

```
Clear["Global`*"];
ode99 = x*D[y[x], x] + a*y[x]^2 - b*y[x] - c*x^\[Beta] == 0
DSolve[%, y[x], x] // TraditionalForm
```

$$\left\{\left\{y(x) \to -\left(\sqrt{-a}\,\sqrt{c}\,x^{\beta/2}\left(-2\,J_{\frac{b}{\beta}-1}\left(\frac{2\sqrt{-a}\,\sqrt{c}\,x^{\beta/2}}{\beta}\right) + c_1\,J_{1-\frac{b}{\beta}}\left(\frac{2\sqrt{-a}\,\sqrt{c}\,x^{\beta/2}}{\beta}\right) - c_1\,J_{-\frac{b+\beta}{\beta}}\left(\frac{2\sqrt{-a}\,\sqrt{c}\,x^{\beta/2}}{\beta}\right)\right)\right.\right.\right.$$
$$\left.\left.\left. b\,c_1\,J_{-\frac{b}{\beta}}\left(\frac{2\sqrt{-a}\,\sqrt{c}\,x^{\beta/2}}{\beta}\right)\right)\Big/\left(2\,a\left(J_{\frac{b}{\beta}}\left(\frac{2\sqrt{-a}\,\sqrt{c}\,x^{\beta/2}}{\beta}\right) + c_1\,J_{-\frac{b}{\beta}}\left(\frac{2\sqrt{-a}\,\sqrt{c}\,x^{\beta/2}}{\beta}\right)\right)\right)\right\}\right\}$$

#100

$$xy'(x) + a + xy(x)^2 = 0$$

Maple

```
restart;
ode100:=x*diff(y(x),x)+a+x*y(x)^2=0:
dsolve(%,y(x));
```

$$y(x) = \frac{\sqrt{a}\,\left(\_C1\,\mathrm{BesselJ}\left(0, 2\sqrt{a}\,\sqrt{x}\right) + \mathrm{BesselY}\left(0, 2\sqrt{a}\,\sqrt{x}\right)\right)}{\sqrt{x}\,\left(\_C1\,\mathrm{BesselJ}\left(1, 2\sqrt{a}\,\sqrt{x}\right) + \mathrm{BesselY}\left(1, 2\sqrt{a}\,\sqrt{x}\right)\right)}$$

Mathematica

```
Clear["Global`*"];
ode100 = x*D[y[x], x] + x*y[x]^2 + a == 0
DSolve[%, y[x], x] // TraditionalForm
```

$$\left\{\left\{y(x) \to -\frac{c_1 J_1\left(2 i \sqrt{-a}\,\sqrt{x}\right) + i \sqrt{-a}\,\sqrt{x}\,\left(c_1 J_0\left(2 i \sqrt{-a}\,\sqrt{x}\right) - c_1 J_2\left(2 i \sqrt{-a}\,\sqrt{x}\right) - 2 J_0\left(2 i \sqrt{-a}\,\sqrt{x}\right)\right)}{2 x \left(J_1\left(2 i \sqrt{-a}\,\sqrt{x}\right) - c_1 J_1\left(2 i \sqrt{-a}\,\sqrt{x}\right)\right)}\right\}\right\}$$

#101

$xy'(x) - y(x) + xy(x)^2 = 0$

Maple

```
restart;
ode101:=x*diff(y(x),x)-y(x)+x*y(x)^2=0:
dsolve(%,y(x));
```

$$y(x) = \frac{2x}{x^2 + 2\_C1}$$

Mathematica

```
Clear["Global`*"];
ode101 = x*D[y[x], x] + x*y[x]^2 - y[x] == 0
DSolve[%, y[x], x] // TraditionalForm
```

$$\left\{\left\{y(x) \to \frac{2x}{2c_1 + x^2}\right\}\right\}$$

#102

$xy'(x) - ax^3 - y(x) + xy(x)^2 = 0$

Maple

```
restart;
ode102:=x*diff(y(x),x)-a*x^3-y(x)+x*y(x)^2=0:
dsolve(%,y(x));
```

$$y(x) = \tanh\left(\frac{1}{2}x^2\sqrt{a} + \_C1\sqrt{a}\right)x\sqrt{a}$$

Mathematica

```
Clear["Global`*"];
ode102 = x*D[y[x], x] + x*y[x]^2 - y[x] - a*x^3 == 0
DSolve[%, y[x], x] // TraditionalForm
```

$$\left\{\left\{y(x) \to \sqrt{a}\, x \tanh\left(\frac{1}{2}\left(2\sqrt{a}\, c_1 + \sqrt{a}\, x^2\right)\right)\right\}\right\}$$

#103

$$xy'(x) - x^3 - (1 + 2x^2)\, y(x) + xy(x)^2 = 0$$

Maple

```
restart;
ode103:=x*diff(y(x),x)-x^3-(1+2*x^2)*y(x)+x*y(x)^2=0:
dsolve(%,y(x));
```

$$y(x) = \frac{1}{2}\, x \left(\sqrt{2} + 2 \tanh\left(\frac{1}{2}\left(x^2 + 2\_C1\right)\sqrt{2}\right)\right)\sqrt{2}$$

Mathematica

```
Clear["Global`*"];
ode103 = x*D[y[x], x] + x*y[x]^2 - (2*x^2 + 1)*y[x] - x^3 == 0
DSolve[%, y[x], x] // TraditionalForm
```

$$\left\{\left\{y(x) \to \frac{x\left(e^{2\sqrt{2}\, c_1} - \sqrt{2}\, e^{2\sqrt{2}\, c_1} + e^{\sqrt{2}\, x^2} + \sqrt{2}\, e^{\sqrt{2}\, x^2}\right)}{e^{2\sqrt{2}\, c_1} + e^{\sqrt{2}\, x^2}}\right\}\right\}$$

#104

$xy'(x) + bx + 2y(x) + axy(x)^2 = 0$

Maple

```
restart;
ode104:=x*diff(y(x),x)+b*x+2*y(x)+a*x*y(x)^2=0:
dsolve(%,y(x));
```

$$y(x) = -\frac{-\frac{-1 + \mathrm{I}\sqrt{a}\sqrt{b}\,x}{x} + \frac{e^{-2\mathrm{I}\sqrt{a}\sqrt{b}\,x}}{\_C1 - \frac{\frac{1}{2}\mathrm{I}\,e^{-2\mathrm{I}\sqrt{a}\sqrt{b}\,x}}{\sqrt{a}\sqrt{b}}}}{a}$$

Mathematica

```
Clear["Global`*"];
ode104 = x*D[y[x], x] + a*x*y[x]^2 + 2*y[x] + b*x == 0
DSolve[%, y[x], x] // TraditionalForm
```

$$\left\{\left\{y(x) \to -\sqrt{\frac{b}{a}}\tan\left(a\,x\sqrt{\frac{b}{a}} - c_1\right) - \frac{1}{a\,x}\right\}\right\}$$

#105

$xy'(x) + d + cx + by(x) + axy(x)^2 = 0$

Maple

```
restart;
ode105:=x*diff(y(x),x)+d+c*x+b*y(x)+a*x*y(x)^2=0:
dsolve(%,y(x));
```

$$y(x) = -\Bigg(4\Bigg(-\frac{1}{4}\_C1\left(d^3c^2a^2 - 2(-ac)^{3/2}adcb - 2(-ac)^{5/2}db + a^2c^3b^2\right)\mathrm{KummerU}\left(\frac{1}{2}\,\frac{d(-ac)^{3/2} + a\left((b+2)c + 2\sqrt{-ac}\,d\right)}{c^2a}, \frac{d(-ac)^{3/2} + a\left((1+b)c + \sqrt{-ac}\,d\right)c}{c^2a}, 2x\sqrt{-ac}\right) + a^2\Big(ac^3\big(ad - b\sqrt{-ac}\big)\mathrm{KummerM}\left(\frac{1}{2}\,\frac{d(-ac)^{3/2} + a\left((b+2)c + 2\sqrt{-ac}\,d\right)c}{c^2a}, \frac{d(-ac)^{3/2} + a\left((1+b)c + \sqrt{-ac}\,d\right)c}{c^2a}, 2x\sqrt{-ac}\right) + ac^3\big(b\sqrt{-ac} + ad\big)\mathrm{KummerM}\left(\frac{1}{2}\,\frac{2adc\sqrt{-ac} + d(-ac)^{3/2} + c^2ab}{c^2a}, \frac{d(-ac)^{3/2} + a\left((1+b)c + \sqrt{-ac}\,d\right)c}{c^2a}, 2x\sqrt{-ac}\right) - \frac{1}{2}\mathrm{KummerU}\left(\frac{1}{2}\,\frac{2adc\sqrt{-ac} + d(-ac)^{3/2} + c^2ab}{c^2a}, \frac{d(-ac)^{3/2} + a\left((1+b)c + \sqrt{-ac}\,d\right)c}{c^2a}, 2x\sqrt{-ac}\right)\_C1\big(bc - \sqrt{-ac} \ldots c^2\big)c^2\Big)\Bigg)\Bigg/\Bigg(-\_C1\left(2(-ac)^{5/2}ad^2c + (-ac)^{7/2}d^2 + b^2a^2c^4\sqrt{-ac}\right)\mathrm{KummerU}\left(\frac{1}{2}\,\frac{d(-ac)^{3/2} + a\left((b+2)c + 2\sqrt{-ac}\,d\right)c}{c^2a}, \frac{d(-ac)^{3/2} + a\left((1+b)c + \sqrt{-ac}\,d\right)c}{c^2a}, 2x\sqrt{-ac}\right) + 4a^2\Big(a^2c^2\big(bc + \sqrt{-ac}\,d\big)\mathrm{KummerM}\left(\frac{1}{2}\,\frac{d(-ac)^{3/2} + a\left((b+2)c + 2\sqrt{-ac}\,d\right)c}{c^2a}, \frac{d(-ac)^{3/2} + a\left((1+b)c + \sqrt{-ac}\,d\right)c}{c^2a}, 2x\sqrt{-ac}\right) + \big(b \ldots - \sqrt{-ac}\,d\big)a^2c^2\,\mathrm{KummerM}\left(\frac{1}{2}\,\frac{2adc\sqrt{-ac} + d(-ac)^{3/2} + c^2ab}{c^2a}, \frac{d(-ac)^{3/2} + a\left((1+b)c + \sqrt{-ac}\,d\right)c}{c^2a}, 2x\sqrt{-ac}\right) + \frac{1}{2}\mathrm{KummerU}\left(\frac{1}{2}\,\frac{2adc\sqrt{-ac} + d(-ac)^{3/2} + c^2ab}{c^2a}, \frac{d(-ac)^{3/2} + a\left((1+b)c + \sqrt{-ac}\,d\right)c}{c^2a}, 2x\sqrt{-ac}\right)\_C1\big(b\sqrt{-ac} + a \ldots c^4\big)\Big)\Bigg)$$

Mathematica

```
Clear["Global`*"];
ode105 = x*D[y[x], x] + a*x*y[x]^2 + b*y[x] + c*x + d == 0
DSolve[%, y[x], x] // TraditionalForm
```

$$\Bigg\{\Bigg\{y(x) \to \Bigg(c_1\Bigg(i\sqrt{a}\,e^{-i\sqrt{a}\sqrt{c}\,x}\left(b\left(-\sqrt{c}\right) - i\sqrt{a}\,d\right)U\left(1 - \frac{-\sqrt{c}\,b - i\sqrt{a}\,d}{2\sqrt{c}}, b+1, 2i\sqrt{a}\sqrt{c}\,x\right) - i\sqrt{a}\sqrt{c}\,e^{-i\sqrt{a}\sqrt{c}\,x}\,U\left(-\frac{-\sqrt{c}\,b - i\sqrt{a}\,d}{2\sqrt{c}}, b, 2i\sqrt{a}\sqrt{c}\,x\right)\Bigg) - i\sqrt{a}\sqrt{c}\,e^{-i\sqrt{a}\sqrt{c}\,x}\,L^{b-1}_{\frac{b(-\sqrt{c}) - i\sqrt{a}\,d}{2\sqrt{c}}}\left(2i\sqrt{a}\sqrt{c}\,x\right) - 2i\sqrt{a}\sqrt{c}\,e^{-i\sqrt{a}\sqrt{c}\,x}\,L^{b}_{-1+\frac{b(-\sqrt{c}) - i\sqrt{a}\,d}{2\sqrt{c}}}\left(2i\sqrt{a}\sqrt{c}\,x\right)\Bigg)\Bigg/$$

$$\Bigg(a\Bigg(c_1\,e^{-i\sqrt{a}\sqrt{c}\,x}\,U\left(-\frac{-\sqrt{c}\,b - i\sqrt{a}\,d}{2\sqrt{c}}, b, 2i\sqrt{a}\sqrt{c}\,x\right) + e^{-i\sqrt{a}\sqrt{c}\,x}\,L^{b-1}_{\ldots}\left(2i\sqrt{a}\sqrt{c}\,x\right)\Bigg)\Bigg)\Bigg\}\Bigg\}$$

#106

$xy'(x) + x^b + \frac{1}{2}(a-b)\,y(x) + x^a y(x)^2 = 0$

Maple

```
restart;
ode106:=x*diff(y(x),x)+x^b+(1/2)*(a-b)*y(x)+x^a*y(x)^2=0:
dsolve(%,y(x));
```

$$y(x) = -\frac{\tan\left(\frac{\_C1\,b + 2\,x^{\frac{1}{2}a + \frac{1}{2}b} + \_C1\,a}{a+b}\right)}{x^{\frac{1}{2}a - \frac{1}{2}b}}$$

Mathematica

```
Clear["Global`*"];
ode106 = x*D[y[x], x] + x^a*y[x]^2 + 1/2*(a - b)*y[x] + x^b == 0
DSolve[%, y[x], x] // TraditionalForm
```

$$\left\{\left\{y(x) \to -x^{\frac{b-a}{2}} \tan\left(\frac{2\,x^{\frac{a+b}{2}}}{a+b} - c_1\right)\right\}\right\}$$

#107

$xy'(x) - cx^{\beta} + by(x) + ax^{\alpha}y(x)^2 = 0$

Maple

```
restart;
ode107:=x*diff(y(x),x)-c*x^beta+b*y(x)+a*x^alpha*y(x)^2=0:
dsolve(%,y(x));
```

$$y(x) = -\left(\left(\operatorname{BesselJ}\left(\frac{b+\beta}{\alpha+\beta}, \frac{2\sqrt{-a\,c}\;x^{\frac{1}{2}\alpha+\frac{1}{2}\beta}}{\alpha+\beta}\right) + \_C1\operatorname{BesselY}\left(\frac{b+\beta}{\alpha+\beta}, \frac{2\sqrt{-a\,c}\;x^{\frac{1}{2}\alpha+\frac{1}{2}\beta}}{\alpha+\beta}\right)\right) x^{\frac{1}{2}\alpha+\frac{1}{2}\beta}\sqrt{-a\,c}\;x^{1-\alpha}\right) \Big/ \left(\left(\_C1\operatorname{BesselY}\left(-\frac{-b+\alpha}{\alpha+\beta}, \frac{2\sqrt{-a\,c}\;x^{\frac{1}{2}\alpha+\frac{1}{2}\beta}}{\alpha+\beta}\right) + \operatorname{BesselJ}\left(-\frac{-b+\alpha}{\alpha+\beta}, \frac{2\sqrt{-a\,c}\;x^{\frac{1}{2}\alpha+\frac{1}{2}\beta}}{\alpha+\beta}\right)\right) a\,x\right)$$

Mathematica

```
Clear["Global`*"];
ode107 = x*D[y[x], x] + a*x^\[Alpha]*y[x]^2 + b*y[x] - c*x^\[Beta] == 0
DSolve[%, y[x], x] // TraditionalForm
```

$$\Bigg\{\Bigg\{y(x) \to \Bigg(x^{1-\alpha}\Bigg((-1)^{\frac{\alpha-b}{\alpha+\beta}}\, a^{\frac{\alpha-b}{\alpha+\beta}+\frac{1}{2}\left(\frac{b}{\alpha+\beta}-\frac{\alpha}{\alpha+\beta}\right)}\, c^{\frac{\alpha-b}{\alpha+\beta}+\frac{1}{2}\left(\frac{b}{\alpha+\beta}-\frac{\alpha}{\alpha+\beta}\right)}\, \left(x^{\alpha+\beta}\right)^{\frac{\alpha-b}{\alpha+\beta}+\frac{1}{2}\left(\frac{b}{\alpha+\beta}-\frac{\alpha}{\alpha+\beta}\right)-1} (\alpha+\beta)^{-\frac{b}{\alpha+\beta}+\frac{\alpha}{\alpha+\beta}+1}$$

$$\left(\alpha^2+2\beta\alpha+\beta^2\right)^{-\frac{\alpha-b}{\alpha+\beta}}\left(\frac{\alpha-b}{\alpha+\beta}+\frac{1}{2}\left(\frac{b}{\alpha+\beta}-\frac{\alpha}{\alpha+\beta}\right)\right) I_{\frac{\alpha-b}{\alpha+\beta}}\left(\frac{2\sqrt{a}\sqrt{c}\sqrt{x^{\alpha+\beta}}}{\sqrt{\alpha^2+2\beta\alpha+\beta^2}}\right)\Gamma\left(-\frac{b}{\alpha+\beta}+\frac{2\alpha}{\alpha+\beta}+\frac{\beta}{\alpha+\beta}\right)x^{\alpha+\beta-1} +$$

$$\frac{1}{2}(-1)^{\frac{\alpha-b}{\alpha+\beta}}\, a^{\frac{\alpha-b}{\alpha+\beta}+\frac{1}{2}\left(\frac{b}{\alpha+\beta}-\frac{\alpha}{\alpha+\beta}\right)+\frac{1}{2}}\, c^{\frac{\alpha-b}{\alpha+\beta}+\frac{1}{2}\left(\frac{b}{\alpha+\beta}-\frac{\alpha}{\alpha+\beta}\right)+\frac{1}{2}}\left(x^{\alpha+\beta}\right)^{\frac{\alpha-b}{\alpha+\beta}+\frac{1}{2}\left(\frac{b}{\alpha+\beta}-\frac{\alpha}{\alpha+\beta}\right)-\frac{1}{2}}(\alpha+\beta)^{-\frac{b}{\alpha+\beta}+\frac{\alpha}{\alpha+\beta}+1}$$

$$\left(\alpha^2+2\beta\alpha+\beta^2\right)^{-\frac{\alpha-b}{\alpha+\beta}-\frac{1}{2}}\left(I_{\frac{\alpha-b}{\alpha+\beta}-1}\left(\frac{2\sqrt{a}\sqrt{c}\sqrt{x^{\alpha+\beta}}}{\sqrt{\alpha^2+2\beta\alpha+\beta^2}}\right)+I_{\frac{\alpha-b}{\alpha+\beta}+1}\left(\frac{2\sqrt{a}\sqrt{c}\sqrt{x^{\alpha+\beta}}}{\sqrt{\alpha^2+2\beta\alpha+\beta^2}}\right)\right)\Gamma\left(-\frac{b}{\alpha+\beta}+\frac{2\alpha}{\alpha+\beta}+\frac{\beta}{\alpha+\beta}\right)x^{\alpha+\beta-1}$$

$$c_1\Bigg(\frac{1}{2}a^{\frac{1}{2}\left(\frac{\alpha}{\alpha+\beta}-\frac{b}{\alpha+\beta}\right)}\, c^{\frac{1}{2}\left(\frac{\alpha}{\alpha+\beta}-\frac{b}{\alpha+\beta}\right)}\left(x^{\alpha+\beta}\right)^{\frac{1}{2}\left(\frac{\alpha}{\alpha+\beta}-\frac{b}{\alpha+\beta}\right)-1}(\alpha+\beta)^{\frac{b}{\alpha+\beta}-\frac{\alpha}{\alpha+\beta}+1}\left(\frac{\alpha}{\alpha+\beta}-\frac{b}{\alpha+\beta}\right)I_{\frac{b-\alpha}{\alpha+\beta}}\left(\frac{2\sqrt{a}\sqrt{c}\sqrt{x^{\alpha+\beta}}}{\sqrt{\alpha^2+2\beta\alpha+\beta^2}}\right)$$

$$\Gamma\left(\frac{b}{\alpha+\beta}+\frac{\beta}{\alpha+\beta}\right)x^{\alpha+\beta-1}+1\Big/\left(2\sqrt{\alpha^2+2\beta\alpha+\beta^2}\right)a^{\frac{1}{2}\left(\frac{\alpha}{\alpha+\beta}-\frac{b}{\alpha+\beta}\right)+\frac{1}{2}}\, c^{\frac{1}{2}\left(\frac{\alpha}{\alpha+\beta}-\frac{b}{\alpha+\beta}\right)+\frac{1}{2}}\left(x^{\alpha+\beta}\right)^{\frac{1}{2}\left(\frac{\alpha}{\alpha+\beta}-\frac{b}{\alpha+\beta}\right)-\frac{1}{2}}$$

$$(\alpha+\beta)^{\frac{b}{\alpha+\beta}-\frac{\alpha}{\alpha+\beta}+1}\left(I_{\frac{b-\alpha}{\alpha+\beta}-1}\left(\frac{2\sqrt{a}\sqrt{c}\sqrt{x^{\alpha+\beta}}}{\sqrt{\alpha^2+2\beta\alpha+\beta^2}}\right)+I_{\frac{b-\alpha}{\alpha+\beta}+1}\left(\frac{2\sqrt{a}\sqrt{c}\sqrt{x^{\alpha+\beta}}}{\sqrt{\alpha^2+2\beta\alpha+\beta^2}}\right)\right)\Gamma\left(\frac{b}{\alpha+\beta}+\frac{\beta}{\alpha+\beta}\right)x^{\alpha+\beta-1}\Bigg)\Bigg)\Bigg)\Big/$$

$$\Bigg(a\Bigg((-1)^{\frac{\alpha-b}{\alpha+\beta}}\, a^{\frac{\alpha-b}{\alpha+\beta}+\frac{1}{2}\left(\frac{b}{\alpha+\beta}-\frac{\alpha}{\alpha+\beta}\right)}\, c^{\frac{\alpha-b}{\alpha+\beta}+\frac{1}{2}\left(\frac{b}{\alpha+\beta}-\frac{\alpha}{\alpha+\beta}\right)}\left(x^{\alpha+\beta}\right)^{\frac{\alpha-b}{\alpha+\beta}+\frac{1}{2}\left(\frac{b}{\alpha+\beta}-\frac{\alpha}{\alpha+\beta}\right)}(\alpha+\beta)^{\frac{\alpha}{\alpha+\beta}-\frac{b}{\alpha+\beta}}\, I_{\frac{\alpha-b}{\alpha+\beta}}\left(\frac{2\sqrt{a}\sqrt{c}\sqrt{x^{\alpha+\beta}}}{\sqrt{\alpha^2+2\beta\alpha+\beta^2}}\right)$$

#108

$xy'(x) - y(x)^2 \ln(x) + y(x) = 0$

Maple

```
restart;
ode108:=x*diff(y(x),x)-y(x)^2*log(x)+y(x)=0;
dsolve(%,y(x));
```

$$y(x) = \frac{1}{1 + \ln(x) + x\_C1}$$

Mathematica

```
Clear["Global`*"];
ode108 = x*D[y[x], x] - y[x]^2*Log[x] + y[x] == 0
DSolve[%, y[x], x] // TraditionalForm
```

$$\left\{\left\{y(x) \to \frac{1}{c_1\, x + \log(x) + 1}\right\}\right\}$$

#109

$xy'(x) - y(x)\,(2y(x)\ln(x) - 1) = 0$

Maple

```
restart;
ode109:=x*diff(y(x),x)-y(x)*(2*log(x)*y(x)-1)=0:
dsolve(%,y(x));
```

$$y(x) = \frac{1}{2 + 2\ln(x) + x\_C1}$$

Mathematica

```
Clear["Global`*"];
ode109 = x*D[y[x], x] - y[x]*(2*y[x]*Log[x] - 1) == 0
DSolve[%, y[x], x] // TraditionalForm
```

$$\left\{\left\{y(x) \to \frac{1}{c_1\, x + 2\log(x) + 2}\right\}\right\}$$

#110

$xy'(x) - f(x)\left(y(x)^2 - x^2\right) = 0$

Maple

```
restart;
ode110:=x*diff(y(x),x)-f(x)*(y(x)^2-x^2)=0:
dsolve(%,y(x));
```

did not solve

Mathematica

```
Clear["Global`*"];
ode110 = x*D[y[x], x] + f[x]*(y[x]^2 - x^2) == 0
DSolve[%, y[x], x] // TraditionalForm
```

did not solve

#111

$xy'(x)+y(x)^3+3xy(x)^2=0$

Maple

```
restart;
ode111:=x*diff(y(x),x)+y(x)^3+3*x*y(x)^2=0;
dsolve(%,y(x));
```

$$\_C1-\frac{\frac{1}{3}\,\mathrm{I}\,e^{\frac{1}{2}\frac{(3\,y(x)\,x-1)^2}{y(x)^2}}}{x}+\frac{1}{2}\,\mathrm{erf}\left(\frac{1}{2}\,\frac{(-\mathrm{I}+3\,\mathrm{I}\,y(x)\,x)\,\sqrt{2}}{y(x)}\right)\sqrt{2}\,\sqrt{\pi}=0$$

Mathematica

```
Clear["Global`*"];
ode111 = x*D[y[x], x] + y[x]^3 + 3*x*y[x]^2 == 0
DSolve[%, y[x], x] // TraditionalForm
```

$$\text{Solve}\left[-3\,x=\frac{2\,e^{\frac{1}{2}\left(\frac{1}{y(x)}-3\,x\right)^2}}{2\,c_1+\sqrt{2\pi}\,\text{erfi}\left(\frac{\frac{1}{y(x)}-3\,x}{\sqrt{2}}\right)},\,y(x)\right]$$

#112

$$xy'(x) - y(x) - \sqrt{x^2 + y(x)^2} = 0$$

Maple

```
restart;
ode112:=x*diff(y(x),x)-y(x)-sqrt(x^2+y(x)^2)=0:
dsolve(%,y(x));
```

$$\frac{y(x)}{x^2} + \frac{\sqrt{x^2 + y(x)^2}}{x^2} - \_C1 = 0$$

Mathematica

```
Clear["Global`*"];
ode112 = x*D[y[x], x] - (y[x]^2 + x^2)^(1/2) - y[x] == 0
DSolve[%, y[x], x] // TraditionalForm
```

$$\{\{y(x) \to x \sinh(c_1 + \log(x))\}\}$$

#113

$$xy'(x) - y(x) + a\sqrt{x^2 + y(x)^2} = 0$$

Maple

```
restart;
ode113:=x*diff(y(x),x)-y(x)+a*sqrt(x^2+y(x)^2):
dsolve(%,y(x));
```

$$\frac{x^a\, y(x)}{x} + \frac{x^a \sqrt{x^2 + y(x)^2}}{x} - \_C1 = 0$$

Mathematica

```
Clear["Global`*"];
ode113 = x*D[y[x], x] + a*(y[x]^2 + x^2)^(1/2) - y[x] == 0
DSolve[%, y[x], x]
```

$$\{\{y(x) \to x \sinh(c_1 - a \log(x))\}\}$$

#114

$xy'(x) - y(x) - x\sqrt{x^2 + y(x)^2} = 0$

Maple

```
restart;
ode114:=x*diff(y(x),x)-x*sqrt(y(x)^2+x^2)-y(x)=0:
dsolve(%,y(x));
```

$$\ln\left(y(x) + \sqrt{y(x)^2 + x^2}\right) - \ln(x) - x - \_C1 = 0$$

Mathematica

```
Clear["Global`*"];
ode114 = x*D[y[x], x] - x*(y[x]^2 + x^2)^(1/2) - y[x] == 0
DSolve[%, y[x], x] // TraditionalForm
```

$$\{\{y(x) \to x\sinh(c_1 + x)\}\}$$

#115

$$xy'(x) - y(x) - x(y(x) - x)\sqrt{x^2 + y(x)^2} = 0$$

Maple

```
restart;
ode115:=x*diff(y(x),x)-y(x)-x*(y(x)-x)*sqrt(x^2+y(x)^2)=0:
dsolve(%,y(x));
```

$$\ln\left(\frac{2x\left(x + y(x) + \sqrt{2x^2 + 2y(x)^2}\right)}{y(x) - x}\right) + \frac{1}{2}\sqrt{2}\,x^2 - \ln(x) - \_C1 = 0$$

Mathematica

```
Clear["Global`*"];
ode115 = x*D[y[x], x] - x*(y[x] - x)*(y[x]^2 + x^2)^(1/2) - y[x] == 0
DSolve[%, y[x], x] // TraditionalForm
```

$$\left\{\left\{y(x) \to \frac{x\left(-2e^{\sqrt{2}c_1 + \frac{x^2}{\sqrt{2}}} + e^{2\sqrt{2}c_1 + \sqrt{2}x^2} - 1\right)}{2e^{\sqrt{2}c_1 + \frac{x^2}{\sqrt{2}}} + e^{2\sqrt{2}c_1 + \sqrt{2}x^2} - 1}\right\}\right\}$$

#116

$$xy'(x) - y(x) - x\sqrt{\left(y(x)^2 - 4x^2\right)\left(y(x)^2 - x^2\right)} = 0$$

Maple

```
restart;
ode116:=x*diff(y(x),x)-y(x)-x*sqrt((y(x)^2-4*x^2)*(y(x)^2-x^2))=0:
dsolve(%,y(x));
```

$$\int_{\_b}^{x} \frac{y(x) + \_a\sqrt{y(x)^4 - 5\,y(x)^2\,\_a^2 + 4\,\_a^4}}{\sqrt{y(x)^4 - 5\,y(x)^2\,\_a^2 + 4\,\_a^4}}\,\mathrm{d}\_a + \int^{y(x)} \left(-\frac{x + \left(\int_{\_b}^{x} \frac{-\_f^4 + 4\,\_a^4}{\left(\_f^4 - 5\,\_f^2\,\_a^2 + 4\,\_a^4\right)^{3/2}}\,\mathrm{d}\_a\right)\sqrt{\_f^4 - 5\,\_f^2\,x^2 + 4\,x^4}}{\sqrt{\_f^4 - 5\,\_f^2\,x^2 + 4\,x^4}} \right)\mathrm{d}\_f + \_C1 = 0$$

Mathematica

```
Clear["Global`*"];
ode116 = x*D[y[x], x]-x*((y[x]^2 - x^2)*(y[x]^2-4*x^2))^(1/2)-y[x] == 0
DSolve[%, y[x], x] // TraditionalForm
```

$$\text{Solve}\left[\frac{2\left(\frac{y(x)}{x}-2\right)^{3/2}\sqrt{-\frac{4}{\frac{y(x)}{x}-2}-1}\,\sqrt{-\frac{3}{\frac{y(x)}{x}-2}-1}\,\sqrt{\frac{1}{\frac{y(x)}{x}-2}+1}\;F\left(\sin^{-1}\left(\frac{\sqrt{-1-\frac{3}{\frac{y(x)}{x}-2}}}{\sqrt{2}}\right)\middle|\,-8\right)}{\sqrt{\frac{y(x)}{x}-1}\,\sqrt{\frac{y(x)}{x}+1}\,\sqrt{\frac{y(x)}{x}+2}} = c_1 + \frac{x^2}{2},\ y(x)\right]$$

#117

$xy'(x) - x - xe^{\frac{y(x)}{x}} - y(x) = 0$

Maple

```
restart;
ode117:=x*diff(y(x),x)-x-x*exp(y(x)/x)-y(x)=0:
dsolve(%,y(x));
```

$$y(x) = x\left(\ln\left(-\frac{x}{-1 + x\,\mathrm{e}^{\_C1}}\right) + \_C1\right)$$

Mathematica

```
Clear["Global`*"];
ode117 = x*D[y[x], x] - x*Exp[y[x]/x] - y[x] - x == 0
DSolve[%, y[x], x] // TraditionalForm
```

Solve::ifun : Inverse functions are being used by Solve, so
some solutions may not be found; use Reduce for complete solution information. ≫

$$\left\{\left\{y(x) \to -x \log\left(\frac{e^{-c_1}}{x} - 1\right)\right\}\right\}$$

#118

$xy'(x) - y(x)\ln(y(x)) = 0$

Maple

```
restart;
ode118:=x*diff(y(x),x)-y(x)*log(y(x))=0;
dsolve(%,y(x));
```

$y(x) = e^{x\_C1}$

Mathematica

```
Clear["Global`*"];
ode118 = x*D[y[x], x] - y[x]*Log[y[x]] == 0
DSolve[%, y[x], x] // TraditionalForm
```

$\{\{y(x) \to e^{e^{c_1} x}\}\}$

#119

$xy'(x) - y(x)(\ln(xy(x)) - 1) = 0$

Maple

```
restart;
ode119:=x*diff(y(x),x)-y(x)*(log(x*y(x))-1)=0:
dsolve(%,y(x));
```

$$y(x) = \frac{e^{\frac{x}{\_C1}}}{x}$$

Mathematica

```
Clear["Global`*"];
ode119 = x*D[y[x], x] - y[x]*(Log[x*y[x]] - 1) == 0
DSolve[%, y[x], x] // TraditionalForm
```

$$\left\{\left\{y(x) \to \frac{e^{e^{c_1} x}}{x}\right\}\right\}$$

#120

$xy'(x) - y(x)\left(2 + x\ln\left(\frac{x^2}{y(x)}\right)\right) = 0$

Maple

```
restart;
ode120:=x*diff(y(x),x)-y(x)*(2+x*log(x^2/y(x)))=0:
dsolve(%,y(x));
```

$$y(x) = \frac{x^2}{e^{\frac{\_C1}{e^x}}}$$

Mathematica

```
Clear["Global`*"];
ode120 = x*D[y[x], x] - y[x]*(x*Log[x^2/y[x]] + 2) == 0
DSolve[%, y[x], x] // TraditionalForm
```

$$\left\{\left\{y(x) \to x^2 e^{-2 c_1 e^{-x}}\right\}\right\}$$

#121

$xy'(x) + \sin(y(x) - x) = 0$

Maple

```
restart;
ode121:=x*diff(y(x),x)+sin(y(x)-x)=0;
dsolve(%,y(x));
```

Did not solve

$$ode121 := x\left(\frac{d}{dx}\,y(x)\right) - \sin(-y(x) + x) = 0$$

=

\>

Mathematica

```
Clear["Global`*"];
ode121 = x*D[y[x], x] + Sin[y[x] - x] == 0
DSolve[%, y[x], x] // TraditionalForm
```

Did not solve

Solve::ifun : Inverse functions are being used by Solve, so some solutions may not be found; use Reduce for complete solution information. ≫

$\text{DSolve}[x\,y'(x) - \sin(x - y(x)) = 0,\, y(x),\, x]$

#122

$xy'(x) + \cos(y(x))(\sin(y(x)) - 3x^2\cos(y(x))) = 0$

Maple

```
restart;
ode122:=x*diff(y(x),x)+cos(y(x))*(sin(y(x))-3*x^2*cos(y(x)))=0:
dsolve(%,y(x));
```

$$y(x) = \arctan\left(\frac{x^3 + 2\_C1}{x}\right)$$

Mathematica

```
Clear["Global`*"];
ode122 = x*D[y[x], x] + (Sin[y[x]] - 3*x^2*Cos[y[x]])*Cos[y[x]] == 0
DSolve[%, y[x], x] // TraditionalForm
```

Solve::ifun : Inverse functions are being used by Solve, so
some solutions may not be found; use Reduce for complete solution information. ≫

$$\left\{\left\{y(x) \to \tan^{-1}\left(\frac{c_1 + 2x^3}{2x}\right)\right\}\right\}$$

#123

$xy'(x) - x\sin\left(\frac{y(x)}{x}\right) - y(x) = 0$

Maple

```
restart;
ode123:=x*diff(y(x),x)-y(x)-x*sin(y(x)/x)=0:
dsolve(%,y(x));
```

$$y(x) = \arctan\left(\frac{2\,x\,\_C1}{1+x^2\,\_C1^2}, -\frac{-1+x^2\,\_C1^2}{1+x^2\,\_C1^2}\right)x$$

Mathematica

```
Clear["Global`*"];
ode123 = x*D[y[x], x] - x*Sin[y[x]/x] - y[x] == 0
DSolve[%, y[x], x] // TraditionalForm
```

Solve::ifun : Inverse functions are being used by Solve, so some solutions may not be found; use Reduce for complete solution information. >>

$$\left\{\left\{y(x) \to 2\,x\cot^{-1}\left(\frac{e^{-c_1}}{x}\right)\right\}\right\}$$

#124

$xy'(x) + x\cos\left(\frac{y(x)}{x}\right) - y(x) + x = 0$

Maple

```
restart;
ode124:=x*diff(y(x),x)+x*cos(y(x)/x)-y(x)+x=0;
dsolve(%,y(x));
```

$y(x) = -2\arctan(\ln(x) + \_C1)\,x$

Mathematica

```
Clear["Global`*"];
ode124 = x*D[y[x], x] + x*Cos[y[x]/x] - y[x] + x == 0
DSolve[%, y[x], x] // TraditionalForm
```

Solve::ifun : Inverse functions are being used by Solve, so some solutions may not be found; use Reduce for complete solution information. ≫

$\{\{y(x) \to 2\,x\tan^{-1}(c_1 - \log(x))\}\}$

#125

$xy'(x) + x\tan\left(\frac{y(x)}{x}\right) - y(x) = 0$

Maple

```
restart;
ode125:=x*diff(y(x),x)+x*tan(y(x)/x)-y(x)=0:
dsolve(%,y(x));
```

$$y(x) = \arcsin\left(\frac{1}{x\_C1}\right)x$$

Mathematica

```
Clear["Global`*"];
ode125 = x*D[y[x], x] + x*Tan[y[x]/x] - y[x] == 0
DSolve[%, y[x], x] // TraditionalForm
```

Solve::ifun : Inverse functions are being used by Solve, so
some solutions may not be found; use Reduce for complete solution information. ≫

$$\left\{\left\{y(x) \to x\sin^{-1}\left(\frac{e^{c_1}}{x}\right)\right\}\right\}$$

#126 $xy'(x) - y(x)\, f(xy(x)) = 0$

Maple

```
restart;
ode126:=x*diff(y(x),x)-y(x)*f(x*y(x))=0:
dsolve(%,y(x));
```

$$y(x) = \frac{\mathit{RootOf}\left(-\ln(x) + \_C1 + \int^{\_Z} \frac{1}{\_a\,(1 + f(\_a))}\, d\_a\right)}{x}$$

Mathematica

```
Clear["Global`*"];
ode126 = x*D[y[x], x] - y[x]*f[x*y[x]] == 0
DSolve[%, y[x], x] // TraditionalForm
```

$$\text{Solve}\left[\int_1^{y(x)}\left(\frac{1}{K[2]\,(-f(x\,K[2])-1)} - \int_1^x\left(\frac{f'(K[1]\,K[2])}{f(K[1]\,K[2])+1} - \frac{f(K[1]\,K[2])\,f'(K[1]\,K[2])}{(f(K[1]\,K[2])+1)^2}\right)dK[1]\right)dK[2] + \int_1^x \frac{f(y(x)\,K[1])}{K[1]\,(f(y(x)\,K[1])+1)}\,dK[1] = c_1,\ y(x)\right]$$

#127

$$xy'(x) - y(x)\,f\left(x^a y(x)^b\right) = 0$$

Maple

```
restart;
ode127:=x*diff(y(x),x)-f(x^a*y(x)^b)*y(x)=0;
dsolve(%,y(x));
```

$$\int_{\_b}^{y(x)} \frac{1}{\_a\left(a + f\left(x^a\,\_a^b\right) b\right)}\, d\_a - \frac{\ln(x)}{b} - \_C1 = 0$$

Mathematica

```
Clear["Global`*"];
ode127 = x*D[y[x], x] - y[x]*f[x^a*y[x]^b] == 0
DSolve[%, y[x], x] // TraditionalForm
```

$$\text{Solve}\left[\int_1^{y(x)}\left(-\int_1^x\left(\frac{b^2\,K[1]^{a-1}\,K[2]^{b-1}\,f'\left(K[1]^a\,K[2]^b\right)}{b\,f\left(K[1]^a\,K[2]^b\right)+a} - \frac{b^3\,K[1]^{a-1}\,K[2]^{b-1}\,f\left(K[1]^a\,K[2]^b\right) f'\left(K[1]^a \ldots\right.}{\left(b\,f\left(K[1]^a\,K[2]^b\right)+a\right)^2}\right.\right.\right.$$
$$\left.\left.\frac{b}{K[2]\left(b\,f\left(x^a\,K[2]^b\right)+a\right)}\right)dK[2] + \int_1^x \frac{b\,f\left(y(x)^b\,K[1]^a\right)}{K[1]\left(b\,f\left(y(x)^b\,K[1]^a\right)+a\right)}\,dK[1] = c_1,\ y(x)\right]$$

#128

$xy'(x) - f(x)\,g(x^a y(x)) + ay(x) = 0$

Maple

```
restart;
ode128:=x*diff(y(x),x)-f(x)*g(x^a*y(x))+a*y(x)=0:
dsolve(%,y(x));
```

$$y(x) = \frac{\mathit{RootOf}\left(-\left(\int x^{-1+a} f(x)\, dx\right) + \int^{\_Z} \frac{1}{g(\_a)}\, d\_a + \_C1\right)}{x^a}$$

Mathematica

```
Clear["Global`*"];
ode128 = x*D[y[x], x] + a*y[x] - f[x]*g[x^a*y[x]] == 0
DSolve[%, y[x], x] // TraditionalForm
```

$$\text{Solve}\left[\int_1^{x^a\, y(x)} \frac{1}{g(K[1])}\, dK[1] = \int_1^x K[2]^{a-1}\, f(K[2])\, dK[2] + c_1,\, y(x)\right]$$

#129

$(1+x)\,y'(x)+y(x)\,(y(x)-x)=0$

Maple

```
restart;
ode129:=(1+x)*diff(y(x),x)+y(x)*(y(x)-x)=0:
dsolve(%,y(x));
```

$$y(x) = -\frac{e^{x}}{e^{x} + e^{-1}\,\mathrm{Ei}(1, -x-1) + e^{-1}\,\mathrm{Ei}(1, -x-1)\,x - \_C1 - \_C1\,x}$$

Mathematica

```
Clear["Global`*"];
ode129 = (1 + x)*D[y[x], x] + y[x]*(y[x] - x) == 0
DSolve[%, y[x], x] // TraditionalForm
```

$$\left\{\left\{y(x) \to -\frac{e^{x+1}}{-e\, c_1\, x - e\, c_1 - x\,\mathrm{Ei}(x+1) - \mathrm{Ei}(x+1) + e^{x+1}}\right\}\right\}$$

#130

$2xy'(x) - 2x^3 - y(x) = 0$

Maple

```
restart;
ode130:=2*x*diff(y(x),x)-2*x^3-y(x)=0:
dsolve(%,y(x));
```

$$y(x) = \frac{2}{5} x^3 + \sqrt{x}\ \_C1$$

Mathematica

```
Clear["Global`*"];
ode130 = 2*x*D[y[x], x] - y[x] - 2*x^3 == 0
DSolve[%, y[x], x] // TraditionalForm
```

$$\left\{\left\{y(x) \to c_1 \sqrt{x} + \frac{2 x^3}{5}\right\}\right\}$$

#131

$(1+2x)\,y'(x)+2-4e^{-y(x)}=0$

Maple

```
restart;
ode131:=(1+2*x)*diff(y(x),x)+2-4*exp(-y(x))=0:
dsolve(%,y(x));
```

$$y(x) = -\ln\left(\frac{1+2x}{-1+2\,e^{2\_C1}+4\,x\,e^{2\_C1}}\right)-2\_C1$$

Mathematica

```
Clear["Global`*"];
ode131 = (2*x + 1)*D[y[x], x] - 4*Exp[-y[x]] + 2 == 0
DSolve[%, y[x], x] // TraditionalForm
```

Solve::ifun :

Inverse functions are being used by Solve, so some solutions may not be found; use Reduce for complete solutio

$$\left\{\left\{y(x)\to \log\left(2-\frac{e^{c_1}}{2x+1}\right)\right\}\right\}$$

#132

$3xy'(x) - y(x) - 3x\log(x)\,y(x)^4 = 0$

Maple

```
restart;
ode132:=3*x*diff(y(x),x)-y(x)-3*x*log(x)*y(x)^4=0:
dsolve(%,y(x));
```

$$y(x) = \frac{\left(-4\,x\left(6\,x^2\ln(x) - 3\,x^2 - 4\,\_C1\right)^2\right)^{1/3}}{6\,x^2\ln(x) - 3\,x^2 - 4\,\_C1},\ y(x) = -\frac{1}{2}\,\frac{\left(-4\,x\left(6\,x^2\ln(x) - 3\,x^2 - 4\,\_C1\right)^2\right)^{1/3}}{6\,x^2\ln(x) - 3\,x^2 - 4\,\_C1} - \frac{\frac{1}{2}\,\mathrm{I}\sqrt{3}\left(-4\,x\left(6\,x^2\ln(x) - 3\,x^2 - 4\,\_C1\right)^2\right)^{1/3}}{6\,x^2\ln(x) - 3\,x^2 - 4\,\_C1},\ y(x) = -\frac{1}{2}\,\frac{\left(-4\,x\left(6\,x^2\ln(x) - 3\,x^2 - 4\,\_C1\right)^2\right)^{1/3}}{6\,x^2\ln(x) - 3\,x^2 - 4\,\_C1} + \frac{\frac{1}{2}\,\mathrm{I}\sqrt{3}\left(-4\,x\left(6\,x^2\ln(x) - 3\,x^2 - 4\,\_C1\right)^2\right)^{1/3}}{6\,x^2\ln(x) - 3\,x^2 - 4\,\_C1}$$

Mathematica

```
Clear["Global`*"];
ode132 = 3*x*D[y[x], x] - 3*x*Log[x]*y[x]^4 - y[x] == 0
DSolve[%, y[x], x] // TraditionalForm
```

$$\left\{\left\{y(x) \to \frac{(-2)^{2/3}\sqrt[3]{x}}{\sqrt[3]{4c_1 + 3x^2 - 6x^2\log(x)}}\right\}, \left\{y(x) \to \frac{2^{2/3}\sqrt[3]{x}}{\sqrt[3]{4c_1 + 3x^2 - 6x^2\log(x)}}\right\}, \left\{y(x) \to -\frac{\sqrt[3]{-1}\,2^{2/3}\sqrt[3]{x}}{\sqrt[3]{4c_1 + 3x^2 - 6x^2\log(x)}}\right.\right.$$

#133

$x^2y'(x) + y(x) = x$

Maple

```
restart;
ode133:=x^2*diff(y(x),x)+y(x)=x:
dsolve(%,y(x));
```

$$y(x) = \left(\mathrm{Ei}\left(1, \frac{1}{x}\right) + \_C1\right) e^{\frac{1}{x}}$$

Mathematica

```
Clear["Global`*"];
ode133 = x^2*D[y[x], x] + y[x] == x
DSolve[%, y[x], x] // TraditionalForm
```

$$\left\{\left\{y(x) \to c_1 e^{\frac{1}{x}} - e^{\frac{1}{x}} \mathrm{Ei}\left(-\frac{1}{x}\right)\right\}\right\}$$

#134

$x^2y'(x) - y(x) = -x^2e^{\left(x-\frac{1}{x}\right)}$

Maple

```
restart;
ode134:=x^2*diff(y(x),x)-y(x)=-x^2*exp(x - 1/x):
dsolve(%,y(x));
```

$$y(x) = \left(-e^x + \_C1\right) e^{-\frac{1}{x}}$$

Mathematica

```
Clear["Global`*"];
ode134 = x^2*D[y[x], x] - y[x] == -x^2*Exp[x - 1/x]
DSolve[%, y[x], x] // TraditionalForm
```

$$\left\{\left\{y(x) \to c_1 e^{-1/x} - e^{x-\frac{1}{x}}\right\}\right\}$$

#135

$x^2 y'(x) - (x-1)\, y(x) = 0$

Maple

```
restart;
ode135:=x^2*diff(y(x),x)-(x-1)*y(x)=0:
dsolve(%,y(x));
```

$$y(x) = \_C1\, x\, e^{\frac{1}{x}}$$

Mathematica

```
Clear["Global`*"];
ode135 = x^2*D[y[x], x] - (-1 + x)*y[x] == 0
DSolve[%, y[x], x] // TraditionalForm
```

$$\left\{\left\{y(x) \to c_1\, e^{\frac{1}{x}}\, x\right\}\right\}$$

#136

$x^2y'(x) + xy(x) + y(x)^2 = -x^2$

Maple

```
restart;
ode136:=x^2*diff(y(x),x)+x*y(x)+y(x)^2=-x^2:
dsolve(%,y(x));
```

$$y(x) = -\frac{x\,(-1 + \ln(x) + \_C1)}{\ln(x) + \_C1}$$

Mathematica

```
Clear["Global`*"];
ode136 = x^2*D[y[x], x] + y[x]^2 + x*y[x] == -x^2
DSolve[%, y[x], x] // TraditionalForm
```

$$\left\{\left\{y(x) \to \frac{-c_1\,x - x + x\log(x)}{c_1 - \log(x)}\right\}\right\}$$

#137

$x^2y'(x) - xy(x) - y(x)^2 = 0$

Maple

```
restart;
ode137:=x^2*diff(y(x),x)-y(x)^2-x*y(x)=0:
dsolve(%,y(x));
```

$$y(x) = -\frac{x}{\ln(x) - \_C1}$$

Mathematica

```
Clear["Global`*"];
ode137 = x^2*D[y[x], x] - y[x]^2 - x*y[x] == 0
DSolve[%, y[x], x] // TraditionalForm
```

$$\left\{\left\{y(x) \to \frac{x}{c_1 - \log(x)}\right\}\right\}$$

#138 $x^2y'(x) - xy(x) - y(x)^2 = x^2$

Maple

```
restart;
ode138:=x^2*diff(y(x),x)-y(x)^2-x*y(x)=x^2:
dsolve(%,y(x));
```

$$y(x) = \tan(\ln(x) + \_C1)\, x$$

Mathematica

```
Clear["Global`*"];
ode138 = x^2*D[y[x], x] - y[x]^2 - x*y[x] == x^2
DSolve[%, y[x], x] // TraditionalForm
```

$$\{\{y(x) \to x \tan(c_1 + \log(x))\}\}$$

#139 $x^2(y'(x) + y(x)^2) = -ax^k + b(b-1)$

Maple

```
restart;
ode139:=x^2*(y(x)^2+diff(y(x),x))=-a*x^k+b*(b-1):
dsolve(%,y(x));
```

$$y(x) = -\left(\_C1\sqrt{a}\,x^{\frac{1}{2}k}\,\mathrm{BesselY}\left(\frac{\sqrt{(2b-1)^2}+k}{k}, \frac{2\sqrt{a}\,x^{\frac{1}{2}k}}{k}\right)\right) \Bigg/ \left(x\left(\_C1\,\mathrm{BesselY}\left(\frac{\sqrt{(2b-1)^2}}{k}, \frac{2\sqrt{a}\,x^{\frac{1}{2}k}}{k}\right) + \mathrm{BesselJ}\left(\frac{\sqrt{(2b-1)^2}}{k}, \frac{2\sqrt{a}\,x^{\frac{1}{2}k}}{k}\right)\right)\right) - \frac{1}{2}\Bigg(\big(-\_C1 - \_C1\,\mathrm{csgn}(2b-1)\,(2b-1)\big)\,\mathrm{BesselY}\left(\frac{\sqrt{(2b-1)^2}}{k}, \frac{2\sqrt{a}\,x^{\frac{1}{2}k}}{k}\right) + 2\,\mathrm{BesselJ}\left(\frac{\sqrt{(2b-1)^2}+k}{k}, \frac{2\sqrt{a}\,x^{\frac{1}{2}k}}{k}\right)\sqrt{a}\,x^{\frac{1}{2}k} + \big(-1 - \mathrm{csgn}(2b-1)\,(2b-1)\big)\,\mathrm{BesselJ}\left(\frac{\sqrt{(2b-1)^2}}{k}, \frac{2\sqrt{a}\,x^{\frac{1}{2}k}}{k}\right)\Bigg) \Bigg/ \left(x\left(\_C1\,\mathrm{BesselY}\left(\frac{\sqrt{(2b-1)^2}}{k}, \frac{2\sqrt{a}\,x^{\frac{1}{2}k}}{k}\right) + \mathrm{BesselJ}\left(\frac{\sqrt{(2b-1)^2}}{k}, \frac{2\sqrt{a}\,x^{\frac{1}{2}k}}{k}\right)\right)\right)$$

Mathematica

```
Clear["Global`*"];
ode139 = x^2*(D[y[x], x] + y[x]^2) == -a*x^k + b*(b - 1)
DSolve[%, y[x], x] // TraditionalForm
```

$$\Bigg\{\Bigg\{y(x) \to -\Bigg(a^{\frac{b}{k}+\frac{1}{2}\left(\frac{1}{k}-\frac{2b}{k}\right)}\left(\frac{b}{k}+\frac{1}{2}\left(\frac{1}{k}-\frac{2b}{k}\right)\right)x^{k-1}\left(x^k\right)^{\frac{b}{k}+\frac{1}{2}\left(\frac{1}{k}-\frac{2b}{k}\right)-1} J_{\frac{2b-1}{k}}\left(\frac{2\sqrt{a}\sqrt{x^k}}{k}\right)\Gamma\left(\frac{2b}{k}-\frac{1}{k}+1\right)k^{1-\frac{1}{k}} + \frac{1}{2}a^{\frac{b}{k}+\frac{1}{2}\left(\frac{1}{k}-\frac{2b}{k}\right)+\frac{1}{2}}x^{k-1}\left(x^k\right)^{\frac{b}{k}+\frac{1}{2}\left(\frac{1}{k}-\frac{2b}{k}\right)-\frac{1}{2}}\left(J_{\frac{2b-1}{k}-1}\left(\frac{2\sqrt{a}\sqrt{x^k}}{k}\right) - J_{\frac{2b-1}{k}+1}\left(\frac{2\sqrt{a}\sqrt{x^k}}{k}\right)\right)\Gamma\left(\frac{2b}{k}\right. -$$

$$k^{-1/k} + c_1\left(a^{\frac{1-b}{k}+\frac{1}{2}\left(\frac{2b}{k}-\frac{1}{k}\right)}\left(\frac{1-b}{k}+\frac{1}{2}\left(\frac{2b}{k}-\frac{1}{k}\right)\right)k^{-\frac{2(1-b)}{k}-\frac{2b}{k}+\frac{1}{k}+1}x^{k-1}J_{\frac{1-2b}{k}}\left(\frac{2\sqrt{a}\sqrt{x^k}}{k}\right)\right.$$

#140 $x^2(y'(x) + y(x)^2) = -4xy(x) - 2$

Maple

```
restart;
ode140:=x^2*(y(x)^2+diff(y(x),x))=-4*x*y(x)-2:
dsolve(%,y(x));
```

$$y(x) = -\frac{2\_C1 - x}{x(\_C1 - x)}$$

Mathematica

```
Clear["Global`*"];
ode140 = x^2*(D[y[x], x] + y[x]^2) == -4*x*y[x] - 2
DSolve[%, y[x], x] // TraditionalForm
```

$$\left\{\left\{y(x) \to \frac{1}{c_1 + x} - \frac{2}{x}\right\}\right\}$$

#141 $x^2(y'(x) + y(x)^2) + axy(x) = -b$

Maple

```
restart;
ode141:=x^2*(y(x)^2+diff(y(x),x))+a*x*y(x)=-b:
dsolve(%,y(x));
```

$$y(x) = \frac{1}{2}\frac{1}{x}\left(1 - a - \tanh\left(-\frac{1}{2}\ln(x)\sqrt{-4b+1-2a+a^2} + \frac{1}{2}\_C1\sqrt{-4b+1-2a+a^2}\right)\sqrt{-4b+1-2a+a^2}\right)$$

Mathematica

```
Clear["Global`*"];
ode141 = x^2*(D[y[x], x] + y[x]^2) + a*x*y[x] == -b
DSolve[%, y[x], x] // TraditionalForm
```

$$\left\{\left\{y(x) \to -\frac{\sqrt{a^2-2a-4b+1}\left(\frac{2c_1}{x^{\sqrt{a^2-2a-4b+1}}+c_1}-1\right)-1}{2x} - \frac{a}{2x}\right\}\right\}$$

#142 $x^2(y'(x) - y(x)^2) - ax^2 y(x) = -ax - 2$

Maple

```
restart;
ode142:=x^2*(-y(x)^2+diff(y(x),x))-a*x^2*y(x)=-2-a*x:
dsolve(%,y(x));
```

$$y(x) = -\frac{\left(2\,a\,x - a^2\,x^2 + a^3\,x^3 - 2\right)\,e^{a\,x} - \_C1}{x\left(\left(2 - 2\,a\,x + a^2\,x^2\right)\,e^{a\,x} + \_C1\right)}$$

Mathematica

```
Clear["Global`*"];
ode142 = x^2*(D[y[x], x] - y[x]^2) - a*x^2*y[x] == -a*x - 2
DSolve[%, y[x], x] // TraditionalForm
```

$$\left\{\left\{y(x) \to -\frac{\frac{1}{a^3\,x^2} + c_1\left(\frac{e^{a\,x}\left(a^2\,x + a\,(a\,x-2)\right)}{x} - \frac{e^{a\,x}\,(a\,x\,(a\,x-2)+2)}{x^2} + \frac{a\,e^{a\,x}\,(a\,x\,(a\,x-2)+2)}{x}\right)}{\frac{c_1\,e^{a\,x}\,(a\,x\,(a\,x-2)+2)}{x} - \frac{1}{a^3\,x}}\right\}\right\}$$

#143 $x^2\left(ay(x)^2+y'(x)\right)=b$

Maple

```
restart;
ode143:=x^2*(a*y(x)^2+diff(y(x),x))=b:
dsolve(%,y(x));
```

$$y(x)=\frac{1}{2}\,\frac{1-\tanh\left(-\frac{1}{2}\ln(x)\sqrt{4ba+1}+\frac{1}{2}\_C1\sqrt{4ba+1}\right)\sqrt{4ba+1}}{xa}$$

Mathematica

```
Clear["Global`*"];
ode143 = x^2*(D[y[x], x] + a*y[x]^2) == b
DSolve[%, y[x], x] // TraditionalForm
```

$$\left\{\left\{y(x)\to-\frac{\sqrt{4ab+1}\left(\frac{2c_1}{x^{\sqrt{4ab+1}}+c_1}-1\right)-1}{2ax}\right\}\right\}$$

#144 $x^2\left(ay(x)^2+y'(x)\right)+c+bx^\alpha=0$

Maple 17

```
restart;
ode144:=x^2*(a*y(x)^2+diff(y(x),x))+b*x^alpha+c=0:
dsolve(%,y(x));
```

$$y(x) = -\frac{1}{2}\Bigg(\Big(\big(-\sqrt{-4ac+1}\ \_C1-\_C1\big)\,\mathrm{BesselY}\Big(\frac{\sqrt{-4ac+1}}{\alpha},\frac{2\sqrt{ab}\,x^{\frac{1}{2}\alpha}}{\alpha}\Big)+2x^{\frac{1}{2}\alpha}\,\mathrm{BesselY}\Big(\frac{\sqrt{-4ac}}{}$$

$$\frac{2\sqrt{ab}\,x^{\frac{1}{2}\alpha}}{\alpha}\Big)\sqrt{ab}\ \_C1+\big(-\sqrt{-4ac+1}-1\big)\,\mathrm{BesselJ}\Big(\frac{\sqrt{-4ac+1}}{\alpha},\frac{2\sqrt{ab}\,x^{\frac{1}{2}\alpha}}{\alpha}\Big)$$

$$+2\,\mathrm{BesselJ}\Big(\frac{\sqrt{-4ac+1}+\alpha}{\alpha},\frac{2\sqrt{ab}\,x^{\frac{1}{2}\alpha}}{\alpha}\Big)\sqrt{ab}\,x^{\frac{1}{2}\alpha}\Big)\Bigg/\Bigg(x\,a\,\Big(\mathrm{BesselY}\Big(\frac{\sqrt{-4ac+1}}{\alpha},\frac{2\sqrt{ab}}{\alpha}$$

$$+\mathrm{BesselJ}\Big(\frac{\sqrt{-4ac+1}}{\alpha},\frac{2\sqrt{ab}\,x^{\frac{1}{2}\alpha}}{\alpha}\Big)\Big)\Bigg)$$

=

Mathematica 9.01

```
Clear["Global`*"];
ode144 = x^2*(D[y[x], x] + a*y[x]^2) + b*x^\[Alpha] + c == 0
DSolve[%, y[x], x]
```

$$\Big\{\Big\{y[x]\to\Big(C[1]\Big(a^{\frac{i\sqrt{-1+4ac}}{2\alpha}+\frac{\alpha-i\sqrt{-1+4ac}\,\alpha}{2\alpha^2}}\ b^{\frac{i\sqrt{-1+4ac}}{2\alpha}+\frac{\alpha-i\sqrt{-1+4ac}\,\alpha}{2\alpha^2}}\ x^{-1+\alpha}\left(x^\alpha\right)^{-1+\frac{i\sqrt{-1+4ac}}{2\alpha}+\frac{\alpha-i\sqrt{-1+4ac}\,\alpha}{2\alpha^2}}\ \alpha^{1-\frac{i\sqrt{-1+4ac}}{\alpha}}$$

$$\Big(\frac{i\sqrt{-1+4ac}}{2\alpha}+\frac{\alpha-i\sqrt{-1+4ac}\,\alpha}{2\alpha^2}\Big)\,\mathrm{BesselJ}\Big[-\frac{\sqrt{\alpha^2-4ac\alpha^2}}{\alpha^2},\frac{2\sqrt{a}\sqrt{b}\sqrt{x^\alpha}}{\alpha}\Big]\,\mathrm{Gamma}\Big[1-\frac{\sqrt{1-4}}{\alpha}$$

$$\frac{1}{2}a^{\frac{1}{2}+\frac{i\sqrt{-1+4ac}}{2\alpha}+\frac{\alpha-i\sqrt{-1+4ac}\,\alpha}{2\alpha^2}}\ b^{\frac{1}{2}+\frac{i\sqrt{-1+4ac}}{2\alpha}+\frac{\alpha-i\sqrt{-1+4ac}\,\alpha}{2\alpha^2}}\ x^{-1+\alpha}\left(x^\alpha\right)^{-\frac{1}{2}+\frac{i\sqrt{-1+4ac}}{2\alpha}+\frac{\alpha-i\sqrt{-1+4ac}\,\alpha}{2\alpha^2}}\ \alpha^{-\frac{i\sqrt{-1+4ac}}{\alpha}}$$

$$\Big(\mathrm{BesselJ}\Big[-1-\frac{\sqrt{\alpha^2-4ac\alpha^2}}{\alpha^2},\frac{2\sqrt{a}\sqrt{b}\sqrt{x^\alpha}}{\alpha}\Big]-\mathrm{BesselJ}\Big[1-\frac{\sqrt{\alpha^2-4ac\alpha^2}}{\alpha^2},\frac{2\sqrt{a}\sqrt{b}\sqrt{x^\alpha}}{\alpha}\Big]\Big)\,\mathrm{G}$$

$$a^{-\frac{i\sqrt{-1+4ac}}{2\alpha}+\frac{\alpha+i\sqrt{-1+4ac}\,\alpha}{2\alpha^2}}\ b^{-\frac{i\sqrt{-1+4ac}}{2\alpha}+\frac{\alpha+i\sqrt{-1+4ac}\,\alpha}{2\alpha^2}}\ x^{-1+\alpha}\left(x^\alpha\right)^{-1-\frac{i\sqrt{-1+4ac}}{2\alpha}+\frac{\alpha+i\sqrt{-1+4ac}\,\alpha}{2\alpha^2}}\ \alpha^{1+\frac{i\sqrt{-1+4ac}}{\alpha}-\frac{\alpha+i\sqrt{-1}}{\alpha^2}}$$

$$\Big(-\frac{i\sqrt{-1+4ac}}{2\alpha}+\frac{\alpha+i\sqrt{-1+4ac}\,\alpha}{2\alpha^2}\Big)\,\mathrm{BesselJ}\Big[\frac{\sqrt{\alpha^2-4ac\alpha^2}}{\alpha^2},\frac{2\sqrt{a}\sqrt{b}\sqrt{x^\alpha}}{\alpha}\Big]\,\mathrm{Gamma}\Big[1+\frac{\sqrt{1-4ac}}{\alpha}$$

$$\frac{1}{2}a^{\frac{1}{2}-\frac{i\sqrt{-1+4ac}}{2\alpha}+\frac{\alpha+i\sqrt{-1+4ac}\,\alpha}{2\alpha^2}}\ b^{\frac{1}{2}-\frac{i\sqrt{-1+4ac}}{2\alpha}+\frac{\alpha+i\sqrt{-1+4ac}\,\alpha}{2\alpha^2}}\ x^{-1+\alpha}\left(x^\alpha\right)^{-\frac{1}{2}-\frac{i\sqrt{-1+4ac}}{2\alpha}+\frac{\alpha+i\sqrt{-1+4ac}\,\alpha}{2\alpha^2}}\ \alpha^{\frac{i\sqrt{-1+4ac}}{\alpha}-\frac{\alpha+i}{}}$$

#145 $-ax^2y^2(x)+ay^3(x)+x^2y'(x)=0$

Maple 17

```
restart;
ode145:=-a*x^2*y(x)^2+a*y(x)^3+x^2*diff(y(x),x)=0:
dsolve(%,y(x));
```

$$y(x) = -1 \Bigg/ \left(x\,a + (-2\,a)^{2/3}\,RootOf\left(\mathrm{AiryBi}\left(\frac{\_Z^2\,(-2\,a)^{1/3}\,x-1}{(-2\,a)^{1/3}\,x}\right)\_C1\,\_Z + \_Z\,\mathrm{AiryAi}\left(\frac{\_Z^2\,(-2\,a)^{1/3}\,x-}{(-2\,a)^{1/3}\,x}\right.\right.\right.$$
$$\left.\left.\left. + \mathrm{AiryBi}\left(1, \frac{\_Z^2\,(-2\,a)^{1/3}\,x-1}{(-2\,a)^{1/3}\,x}\right)\_C1 + \mathrm{AiryAi}\left(1, \frac{\_Z^2\,(-2\,a)^{1/3}\,x-1}{(-2\,a)^{1/3}\,x}\right)\right)\right)$$

Mathematica 9.01

```
Clear["Global`*"];
ode145 = x^2*D[y[x], x] + a*y[x]^3 - a*x^2*y[x]^2 == 0
DSolve[%, y[x], x]
```

$$\mathrm{Solve}\Bigg[C[1] + \Bigg(\mathrm{AiryAiPrime}\Big[\frac{1}{2^{1/3}\,a^{1/3}\,x} + \Big(-\frac{a^{1/3}\,x}{2^{2/3}} - \frac{1}{2^{2/3}\,a^{2/3}\,y[x]}\Big)^2\Big] +$$
$$\mathrm{AiryAi}\Big[\frac{1}{2^{1/3}\,a^{1/3}\,x} + \Big(-\frac{a^{1/3}\,x}{2^{2/3}} - \frac{1}{2^{2/3}\,a^{2/3}\,y[x]}\Big)^2\Big]\,\Big(-\frac{a^{1/3}\,x}{2^{2/3}} - \frac{}{2^{2/3}\,a}$$
$$\Big(\mathrm{AiryBiPrime}\Big[\frac{1}{2^{1/3}\,a^{1/3}\,x} + \Big(-\frac{a^{1/3}\,x}{2^{2/3}} - \frac{1}{2^{2/3}\,a^{2/3}\,y[x]}\Big)^2\Big] + \mathrm{AiryBi}\Big[$$
$$\frac{1}{2^{1/3}\,a^{1/3}\,x} + \Big(-\frac{a^{1/3}\,x}{2^{2/3}} - \frac{1}{2^{2/3}\,a^{2/3}\,y[x]}\Big)^2\Big]\,\Big(-\frac{a^{1/3}\,x}{2^{2/3}} - \frac{1}{2^{2/3}\,a^{2/3}\,y[}$$

#146 $x^2y'(x) + ay(x)^2 + xy(x)^3 = 0$

Maple 17.01

```
restart;
ode146:=x^2*diff(y(x),x)+a*y(x)^2+x*y(x)^3=0:
dsolve(%,y(x));
```

$$\_C1 + \left(x + \frac{1}{2} a \sqrt{\pi} \sqrt{2} \operatorname{erf}\left(\frac{1}{2} \frac{\sqrt{2}\,(a y(x) + x)}{y(x)\, x}\right) e^{\frac{1}{2} \frac{(a y(x) + x)^2}{y(x)^2 x^2}}\right) e^{-\frac{1}{2} \frac{((a-x) y(x) + x)\,((a+x) y(x}{y(x)^2 x^2}}$$

= .

Mathematica 9.01

```
Clear["Global`*"];
ode146 = x^2*D[y[x], x] + x*y[x]^3 + a*y[x]^2 == 0
DSolve[%, y[x], x]
```

$$\text{Solve}\left[-\frac{i a}{x} == \frac{2 e^{\frac{1}{2}\left(-\frac{i a}{x} - \frac{i}{y[x]}\right)^2}}{2 C[1] + \sqrt{2\pi}\, \text{Erfi}\left[\frac{-\frac{i a}{x} - \frac{i}{y[x]}}{\sqrt{2}}\right]}, y[x]\right]$$

#147 $ax^2y(x)^3 + by(x)^2 + x^2y'(x) = 0$

Maple 17.01

```
restart;
ode147:=a*x^2*y(x)^3+b*y(x)^2+x^2 * diff(y(x),x)=0:
dsolve(%,y(x));
```

$$y(x) = -\left(2^{1/3} a b x\right) \bigg/ \left(2^{1/3} a b^2 - 2\left(a^2 b^2\right)^{2/3} RootOf\left(\mathrm{AiryBi}\left(-\frac{1}{2} \frac{a 2^{2/3} x - 2 \_Z^2 \left(a^2 b^2\right)^{1/3}}{\left(a^2 b^2\right)^{1/3}}\right) \_C1 \_Z + \_Z \mathrm{AiryAi}\left(-\frac{1}{2} \frac{a 2^{2/3} x - 2 \_Z^2 \left(a^2 b^2\right)^{1/3}}{\left(a^2 b^2\right)^{1/3}}\right) + \mathrm{AiryBi}\left(1, -\frac{1}{2} \frac{a 2^{2/3} x - 2 \_Z^2 \left(a^2 b^2\right)^{1/3}}{\left(a^2 b^2\right)^{1/3}}\right) \_C1 + \mathrm{AiryAi}\left(1, -\frac{1}{2} \frac{a 2^{2/3} x - 2 \_Z^2 \left(a^2 b^2\right)^{1/3}}{\left(a^2 b^2\right)^{1/3}}\right)\right) x\right)$$

=

Mathematica 9.01

```
Clear["Global`*"];
ode147 = x^2*D[y[x], x] + a*x^2*y[x]^3 + b*y[x]^2 == 0;
DSolve[%, y[x], x]
```

$$\mathrm{Solve}\Bigg[C[1] + \left(\mathrm{AiryAiPrime}\left[-\frac{a^{1/3} x}{2^{1/3} b^{2/3}} + \left(\frac{b^{2/3}}{2^{2/3} a^{1/3} x} + \frac{1}{2^{2/3} a^{1/3} b^{1/3} y[x]}\right)^2\right] + \ldots \left(\frac{b^{2/3}}{2^{2/3} a^{1/3} x} + \frac{1}{2^{2/3} a^{1/3} b^{1/3} y[x]}\right)^2\right] \left(\frac{b^{2/3}}{2^{2/3} a^{1/3} x} + \frac{1}{2^{2/3} a^{1/3} b^{1/3} \ldots}\right.$$
$$\left(\mathrm{AiryBiPrime}\left[-\frac{a^{1/3} x}{2^{1/3} b^{2/3}} + \left(\frac{b^{2/3}}{2^{2/3} a^{1/3} x} + \frac{1}{2^{2/3} a^{1/3} b^{1/3} y[x]}\right)^2\right] + \mathrm{AiryBi}\left[-\frac{a^{1/3} x}{2^{1/3} b^{2/3}} + \left(\frac{b^{2/3}}{2^{2/3} a^{1/3} x} + \frac{1}{2^{2/3} a^{1/3} b^{1/3} y[x]}\right)^2\right] \left(\frac{b^{2/3}}{2^{2/3} a^{1/3} x} + \frac{1}{2^{2/3} a^{1/3} b^{1/3} y[x]}\right)\right) == 0,\ y[x]\Bigg]$$

#148 $(x^2+1)\,y'(x)+xy(x)-1=0$

Maple 17.01

```
restart;
ode148:=(x^2+1)* diff(y(x),x)+x*y(x)-1=0:
dsolve(%,y(x));
```

$$y(x)=\frac{\operatorname{arcsinh}(x)+\_C1}{\sqrt{x^2+1}}$$

Mathematica 9.01

```
Clear["Global`*"];
ode148 = (x^2 + 1)*D[y[x], x] + x*y[x] - 1 == 0;
DSolve[%, y[x], x]
```

$$\left\{\left\{y[x]\to\frac{\text{ArcSinh}[x]}{\sqrt{1+x^2}}+\frac{C[1]}{\sqrt{1+x^2}}\right\}\right\}$$

#149 $(x^2+1)\,y'(x) - x(x^2+1) + xy(x) = 0$

Maple 17.01

```
restart;
ode149:=(x^2+1)* diff(y(x),x)-x *(x^2+1)+x *y(x)=0:
dsolve(%,y(x));
```

$$y(x) = \frac{1}{3}x^2 + \frac{1}{3} + \frac{\_C1}{\sqrt{x^2+1}}$$

Mathematica 9.01

```
Clear["Global`*"];
ode149 = (x^2 + 1)*D[y[x], x] + x*y[x] - x*(x^2 + 1) == 0;
DSolve[%, y[x], x]
```

$$\left\{\left\{y[x] \to \frac{1}{3}\left(1+x^2\right) + \frac{C[1]}{\sqrt{1+x^2}}\right\}\right\}$$

#150 $\left(x^2+1\right) y'(x) - 2x^2 + 2xy(x) = 0$

Maple 17.01

```
restart;
ode150:=(x^2+1)* diff(y(x),x)-2* x^2+2* x* y(x)=0:
dsolve(%,y(x));
```

$$y(x) = \frac{\frac{2}{3}x^3 + \_C1}{x^2+1}$$

Mathematica 9.01

```
Clear["Global`*"];
ode150 = (x^2 + 1)*D[y[x], x] + 2*x*y[x] - 2*x^2 == 0;
DSolve[%, y[x], x]
```

$$\left\{\left\{y[x] \to \frac{2 x^3}{3\left(1+x^2\right)} + \frac{C[1]}{1+x^2}\right\}\right\}$$

#151 $(x^2+1)\,y'(x)+(2xy(x)-1)\,(y(x)^2+1)=0$

Maple 17.01

```
restart;
ode151:=(x^2+1)* diff(y(x),x)+(2* x *y(x)-1)* (y(x)^2+1)=0:
dsolve(%,y(x));
```

$$\_C1+\frac{x}{\left(\left(\frac{1}{x}+\frac{x^2}{\frac{x^4 y(x)}{x^2+1}-\frac{x^3}{x^2+1}}\right)^2+1\right)^{1/4}}+\frac{(x+y(x))\,\mathrm{hypergeom}\left(\left[\frac{1}{2},\frac{5}{4}\right],\left[\frac{3}{2}\right],-\frac{(x+y(x))^2}{(xy(x)-1)^2}\right)}{2\,xy(x)-2}$$

$= 0$

Mathematica 9.01

```
Clear["Global`*"];
ode151 = (x^2 + 1)*D[y[x], x] + (y[x]^2 + 1)*(2*x*y[x] - 1) == 0;
DSolve[%, y[x], x]
```

$$\mathrm{Solve}\Big[C[1] == \left(i\,x+\frac{1}{2}\,\mathrm{Hypergeometric2F1}\left[\frac{1}{2},\frac{5}{4},\frac{3}{2},\left(\frac{i}{x}+\frac{1}{\frac{i\,x}{1+x^2}-\frac{i\,x^2\,y[x]}{1+x^2}}\right)^2\right]\left(\frac{i}{x}+\ldots\right.\right.$$

$$\left.\left(1-\left(\frac{i}{x}+\frac{1}{\frac{i\,x}{1+x^2}-\frac{i\,x^2\,y[x]}{1+x^2}}\right)^2\right)^{1/4}\right)\Big/\left(-1+\left(\frac{i}{x}+\frac{1}{\frac{i\,x}{1+x^2}-\frac{i\,x^2\,y[x]}{1+x^2}}\right)^2\right)^{1/4}$$

#152 $(x^2+1)\,y'(x) - x(x^2+1)\cos^2(y(x)) + x\sin(y(x))\cos(y(x)) = 0$

Maple 17.01

```
restart;
ode152:=(x^2+1)*diff(y(x),x)-x * (x^2+1)* cos(y(x))^2+x* sin(y(x)) *cos(y(x))=0:
dsolve(%,y(x));
```

$$y(x) = \arctan\left(\frac{1}{3}\,\frac{(x^2+1)^{3/2} + 3\_C1}{\sqrt{x^2+1}}\right)$$

Mathematica 9.01

```
Clear["Global`*"];
ode152 = (x^2 + 1)*D[y[x], x] + x*Sin[y[x]]*Cos[y[x]] -
    x*(x^2 + 1)*Cos[y[x]]^2 == 0;
DSolve[%, y[x], x]
```

Solve::ifun : Inverse functions are being used by Solve, so some solutions may not be found; use Reduce for complete solution information. ≫

$$\left\{\left\{y[x] \to \text{ArcTan}\left[\frac{1 + 2x^2 + x^4 - 6\sqrt{1+x^2}\;C[1]}{3\,(1+x^2)}\right]\right\}\right\}$$

#153 $a+\left(x^2-1\right)y'(x)-xy(x)=0$

Maple 17.01

```
restart;
ode153:=a+(x^2-1)* diff(y(x),x)-x* y(x)=0:
dsolve(%,y(x));
```

$$y(x)=\sqrt{x-1}\,\sqrt{x+1}\,\_C1+xa$$

Mathematica 9.01

```
Clear["Global`*"];
ode153 = (x^2 - 1)*D[y[x], x] - x*y[x] + a == 0;
DSolve[%, y[x], x]
```

$$\left\{\left\{y[x]\to a\,x+\sqrt{-1+x^2}\,C[1]\right\}\right\}$$

#154 $\left(x^2-1\right)y'(x)+2xy(x)-\cos(x)=0$

Maple 17.01

```
restart;
ode154:=(x^2-1)* diff(y(x),x)+2* x *y(x)-cos(x)=0:
dsolve(%,y(x));
```

$$y(x)=\frac{\sin(x)+\_C1}{x^2-1}$$

Mathematica 9.01

```
Clear["Global`*"];
ode154 = (x^2 - 1)*D[y[x], x] + 2*x*y[x] - Cos[x] == 0;
DSolve[%, y[x], x]
```

$$\left\{\left\{y[x]\to\frac{C[1]}{-1+x^2}+\frac{\mathrm{Sin}[x]}{-1+x^2}\right\}\right\}$$

#155 $\left(x^2-1\right)y'(x)+y(x)^2-2xy(x)+1=0$

Maple 17.01

```
restart;
ode155:=(x^2-1)*diff(y(x),x)+y(x)^2-2* x* y(x)+1=0:
dsolve(%,y(x));
```

$$y(x)=x+\frac{1}{\_C1-\operatorname{arctanh}(x)}$$

Mathematica 9.01

```
Clear["Global`*"];
ode155 = (x^2 - 1)*D[y[x], x] + y[x]^2 - 2*x*y[x] + 1 == 0;
DSolve[%, y[x], x]
```

$$\left\{\left\{y[x]\to-\frac{x\left(1-x^2\right)}{-1+x^2}+\frac{1}{C[1]+\frac{1}{2}\text{Log}[1-x]-\frac{1}{2}\text{Log}[1+x]}\right\}\right\}$$