

1. (6 pts) Evaluate

(a) $\left(\frac{1-i}{1+\sqrt{3}i}\right)^{36}$,

(b) $(-2 - 2i)^{\frac{1}{2}}$,

(c) $\lim_{x \rightarrow 0} \left(\frac{1}{x^2} - \frac{\cos x}{\sin^2 x}\right)$. ✓

2. (3 pts) Evaluate

$$\left(\sum_{n=0}^{\infty} r^{2n} \cos nt\right)^2 + \left(\sum_{n=0}^{\infty} r^{2n} \sin nt\right)^2$$

for a real number r satisfying $|r| < 1$.

3. (5 pts) (a) Find the circle of convergence for the following complex power series: ✓

$$\sum_{n=1}^{\infty} \frac{(n!)^3 \ln n}{(3n)!} (z - i)^n$$

- (b) Let z be a nonzero complex number. For what value of z is the series $\sum_{n=1}^{\infty} z^{\ln n}$ absolutely convergent? Explain your answer.

4. (3 pts) (a) Find complex numbers z such that $|z - 3i| = 2 - 2zi$.

- (b) Describe the set of points z such that $\operatorname{Im}(e^{i\pi/2} z) < 1$.

5. (4 pts)(a) Find two variable Maclaurin series for $\frac{\cos y}{1-x}$.

(b) About how much does a relative error of 2 percent in a and b effect the relative error of $\sqrt{\frac{a}{b}}$ in the worst case?

6. (3 pts) Use power series to evaluate $e^{-x^2/2} - 1 - \ln \cos x$ at $x = .0011$.