University of California, Irvine Spring 2003

MAE 185 Numerical Methods for Mechanical Engineers

Project #1

Write a computer program to find the roots of a polynomial using Bairstow's method.

Input: up to 6 degree polynomial.

1. The degree of the polynomial, n. (The maximum value of n is 6)
2. The coefficients of the polynomial.
3. Initial values of r and s.
4. The percentage error, ε.

$$\left|\frac{r_{i+1}-r_i}{r_{i+1}}\right| \le \varepsilon \quad \text{AND} \quad \left|\frac{s_{i+1}-s_i}{s_{i+1}}\right| \le \varepsilon$$

The Program:

The program will start with the initial values of r and s and will perform the necessary iterations of the Bairstow's method until the values of r and s are found with error less than ε.

The program will then find the coefficients of the polynomial of n-2 degrees, seek initial values of r, s and ε and continue until all the quadratic factors are found.

Output:

The output of the program will be as follows.

1. New values of r and s after each iteration. — all values as we iterate for each factors
2. All the quadratic factors along with the total number of iterations needed, initial values of r and s and ε for each quadratic factor.

General Comments:

The input screen and output should be well formatted, user friendly, presentable and easily readable.

Submit:

1. Printout of the program, if possible.
2. One page explanation of your work and how to use the program.
3. Floppy contain the program with the file name written on it.

Submission Date: Thursday April 30, 2003.