Online: 3 Section: B1

Time: 40 Minutes Total: 10

Problem Statement: Determine the all possible real roots of the equation: $f(x) = x^3 - 6x^2 + 11x - 6 = 0$ using Modified Bisection Method.

Tasks:

1. Write a program using Modified Bisection Method to locate the approximate roots of the function $f(x) = x^3 - 6x^2 + 11x - 6 = 0$ for different initial intervals.
2. Write a function name modifiedBisection(x1, x2) for finding the roots for different intervals.
3. Write a function name applyHorners(coeff) that implements Horner's rule to perform all the iterations of the modifiedBisection(x1, x2) until the estimated error ϵ_a falls below a level of ϵ_s = 0.0001 i.e applyHorners(xroot)<0.0001.
4. Use synthetic division to deflate the polynomial at lower degree. Write a function polynomialDeflation() that will return the coefficients of deflated polynomial.
   Algorithm for Synthetic Division:
   $b_{i-1} = a_i + x_r b_i \quad ; for\ i = n, n-1, \ldots 0$
   $b_n = 0$

   Where a is the coefficient at degree n and b is the coefficient at degree $n-1$
5. If all the roots are already found then stop finding the roots.
6. Use appropriate functions from math header file.
7. Print the following table as output.

Sample Input/output:

Enter the highest degree of polynomial:
Maximum number of roots are: 3
Enter the coefficients:
X^3: 1
X^2: -6
X^1: 11
X^0: -6
Enter interval increment size: 0.001
Enter four sets of intervals:
0-1
0-2
0-3
0-4

For interval size	number of roots	roots
0-1	1	0.999999
0-2	2	0.999999 1.999998
0-3	3	0.999999 1.999998 3.000004
0-4	maximum number of roots already found.	