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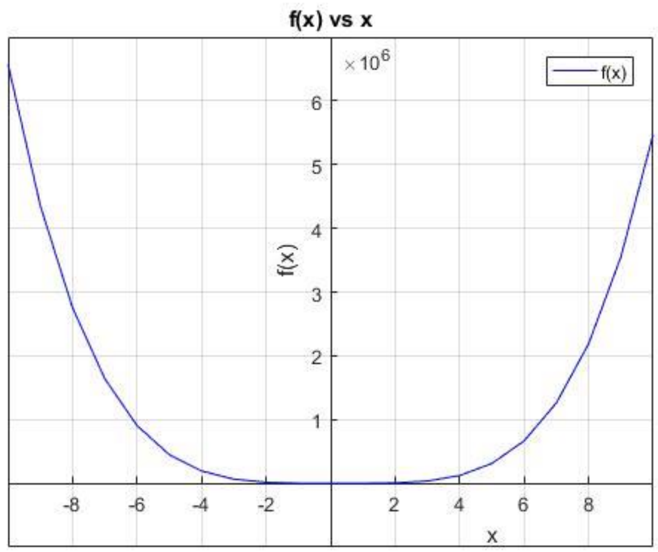
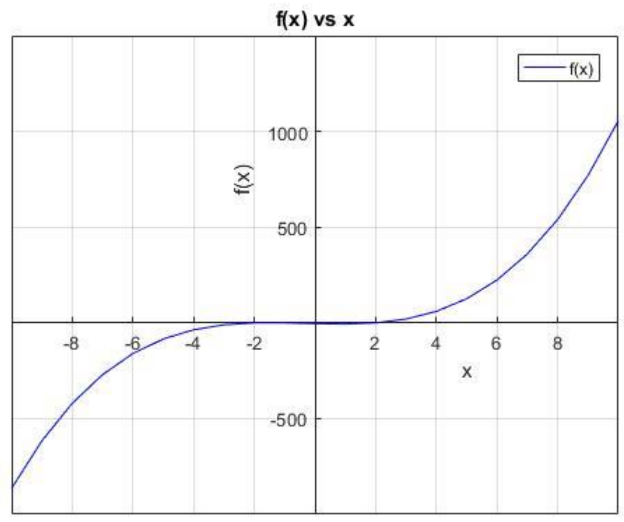
Section – G10

QUESTION-2

Test Case 1: $600x^4 - 550x^3 + 200x^2 - 20x$



Test Case 2: $f(x) = x^3 + x^2 - 4x - 4$



1. MULLER'S METHOD

Test Case 1: $\boldsymbol{600x^4 - 550x^3 + 200x^2 - 20x - 1}$

x_0=0.0, $x_1 = 0.1$, $x_2 = 0.3$,Maximum Relative Approximate Error = 0.05%

Root of the given Polynomial is **0.232353**

Test Case 2: $\boldsymbol{x^3 + x^2 - 4x - 4}$

x_0=0.0, $x_1 = 0.5$, $x_2 = 1.0$,Maximum Relative Approximate Error = 0.05%

Root of the given Polynomial is **2.000000**

The order of convergence of Muller's method is approximately 1.84 and possibly divergent.

Secant method obtains a root estimate by projecting a straight line to the *x* axis through two function values. Müller's method takes a similar approach, but projects a parabola through three points.

This can be compared with 1.62 for the secant method and 2 for Newton's method. So, the secant method makes less progress per iteration than Muller's method and Newton's method makes more progress.

2. BAIRSTOW METHOD

Test Case 1: $\boldsymbol{600x^4 - 550x^3 + 200x^2 - 20x - 1}$

r=-1, $s = -1$, Maximum Relative Approximate Error = 0.05%

Roots of the given Polynomial are **0.232353, -0.035840 ,0.360056, 0.360056**

Test Case 2: $\boldsymbol{x^3 + x^2 - 4x - 4}$

r=-1, $s = -1$, Maximum Relative Approximate Error = 0.05%

Roots of the given Polynomial are **2.000000, -1.000000, -2.000000**

Bairstow Method is one of the most versatile method used to calculate all the roots of given polynomial iteratively. The algorithm can also find the roots in complex conjugate pairs using only real arithmetic.

Bairstow Method is possibly divergent.

Bairstow's algorithm inherits the local quadratic convergence of Newton's method, except in the case of quadratic factors of multiplicity higher than 1, when convergence to that factor is linear.