Numerical Method

Assignment

Unit 1: Solution of non Linear Equations

1. What are the sources of errors? Discuss various types of errors.
2. Find one root of $x^3 - 2x - 5 = 0$ with the accuracy of 0.08% using bisection method. **Ans: 2.0937**
3. Find at least one root of the equation $x^2 + \tan x + e^x = 0$ correct up to 3 significant digits using bisection method. **Ans : -0.861**
4. Find at least one root of the following equations using Newton Raphson method
   a. $e^{x-1} - 5x^3$ correct up to 4 decimal places **Ans: 0.4940**
   b. $x = e^{-x}$ correct up to 5 decimal places **Ans: 0.56714**
5. Find a real root of following equations using secant method
   a. $f(x) = e^{\cos x} + \sin(x)$ up to 3 decimal places **Ans: -1.5707**
   b. $f(x) = 3x + \sin x - e^x$ up to 5th iterations **Ans: 0.3604**
6. Solve the non- linear equation $\log x - \cos x = 0$ by using false position method correct to four decimal places. **Ans: 1.4184**

Hint: If two initial guesses of secant method brackets the root then it is called false position method. We use same method and formula of secant.

7. Find the root of $x - \sin[x] - (1/2) = 0$ correct to 4 decimal places using fixed point iteration method. **Ans: 1.49729**
8. Find the first approximate root of the equation $\cos x = 3x - 1$ up to 4 decimal places. **Ans: 0.60710**
9. Evaluate the polynomial $f(x) = x^4 + 3x^3 + 5x^2 + 7x + 9$ at $x = 2$ using Horner's Rule. **Ans: 83**