ASSIGNMENT 1

1. Verify Rolle's Theorem for the function $f(x) = x^4 - 1$ in $[-1, 1]$. Can we apply the theorem for $f(x) = |x|$ in $[-2, 2]$?

2. Verify Lagrange's mean value theorem for the function $f(x) = \sqrt{x^4 - 1}$ in $[2, 4]$.

3. Write the Taylor's series of $\log sin(x + h)$ in powers of h.

4. Determine the decimal number that correspond to machine word: $[CA3F2900]_{16}$

5. Find the real root of the equation $x^3 - 2x - 5 = 0$ correct to three decimal places by using Bisection method.

6. Find the real root of the equation $x^4 - x - 10 = 0$, which is near 2, correct to three decimal places by using Newton- Raphson method.

7. Find the real root of the equation $\cos x - xe^x = 0$ correct to four decimal places in $[0, 1]$ by using secant method.

8. Find the minimum of $f(x) = x(x - 1.5)$ in $[0, 1]$ using Fibonacci search algorithm by taking $n = 4$.

9. Find the minimum of $f(x) = x(x - 1.5)$ in $[0, 1]$ by Golden section search rule with interval of uncertainty as 0.3

10. By the method of steepest descent minimize the function

$f(x, y) = 4x^2 + 4xy + 2y^2$ by taking initial point $X_0 = (2, 3)$.

ASSIGNMENT 1 (ANSWERS)

1. No, as $f(x)$ is not differentiable at $x = 0$

3. $\log sin(x + h) = \log \sin x + h \cot x - \frac{h^2}{2!} cosec^2 x + \frac{2h^3}{3!} cosec^2 x \cot x + \cdots$

4. -3.131968×10^6 **5.** 2.095 **6.** 1.856 **7.** 0.5178

8. $Min\ f(x) = -0.5619\ at\ x = 0.725$ **9.** $Min\ f(x) = -0.5623\ at\ x = 0.736$

10. $Min\ f(x, y) = 0\ at\ (0, 0)$