Assignment # 2

Degree / Syndicate: _____   NAME: _____   REGISTRATION No:

Q. 1   The single positive zero of the function $f(x) = x\tanh(\frac{x}{2}) - 1$ models the wavenumber of the water wave at a certain frequency in the water of depth 0.5 (don't worry about the units here).

    a)   Use the Bisection Method to approximate the zero of $f(x)$ to four decimal places

    c)   Wirte a Matlab code for the Bisection Method and approximate the zero of $f(x)$ to six decimal places.

Note: Attach hard copy of Matlab code and print result and error after each iteration

Q. 2   Approximate solution of $x = (13)^{\frac{1}{3}}$ to three decimal places by applying Bisection Method.

Q. 3   In 1971 astronaut Alan Shepard walked on the moon's surface. He hit a golf ball, which was launched upward and followed the trajectory $f(x) = \sqrt[3]{x^2}(2x - 1)$. The trajectory of the ball differed from what it would have been on earth because the acceleration due to gravity on the moon is about six times smaller than that on earth. Use False Position Method with initial point $a = 1$ to estimate the critical point of the ball's trajectory. Show the sequence of iterations and perform 3 iterations

Q.4   Can you use false position method to find a zero of $x^3 - 3x + 1 = 0$, in the interval $[0 \quad 2]$. Give mathematical justification of your answer.

Q.5   Use false position method with $x_0 = 0.5$ to find the point where temperature is maximum in the pressurized vessel

$$T(x) = x - P(x), \quad where \quad P(x) = \frac{1 + 3x^2}{4 + x^3}.$$

Show the sequence of iterations and perform five iterations.