ITCS 306 – Numerical Methods

Final Quiz (Section 1)

Submit your programs to the instructor by December 15, 2018.
Present your programs to the instructor by December 29, 2018 (by appointment)

A. We want to evaluate the value of e^M where M is a real number. Assume that we only know how to do ln(Y) where Y is a real number and we don't know the value of e. Write a program using the False Position method to evaluate the value of e^M where you can set $x = e^M$ and $\ln(x) = M$. You need to find $[x_l, x_u]$ as your input to the method using interval search method.

B. Given the function $f(x) = x^3 - 6x^2 + x - 4$ and $g(x) = 3\sin(x) + \cos^2(x)$, we want the accuracy of our result to be accurate up to 4 significant figures,

1. Write a program based on the golden section search to find the value of x at the local minimum of f(x) between interval (0,6) and g(x) between interval $(\pi,2\pi)$. Given that $d = (\emptyset - 1)(x_u - x_l)$ and $\emptyset = \frac{1+\sqrt{5}}{2} = 1.6180$.

2. Write a program based on the parabolic interpolation technique to find the <u>maximum</u> of the function f(x), given the following initial values: $x_1 = -2, x_2 = 0, x_3 = 2$, and function g(x), given the following initial values: $x_1 = -\pi/2, x_2 = 0, x_3 = \pi$,

C. Given the following system of linear equations below,

$$x + 3y - 2z = 1$$
$$3x + 2y + 6z = -2$$
$$2x + 4y + 3z = 2$$

Create the simplified matrix form for this system (Ax = b). **Write a set of programs** to perform the following tasks:

1. Find determinant of A without using recursion. Note that the determinant function should be able to apply to any size of a square matrix.
2. Find x, y, and z using Cramer's rule.
3. Find inverse of A using Minor, Cofactor and Adjugate method.