**CS3081 – Computational Mathematics**

**Assignment 1**

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***Question 3.2 –*** *Determine the root of by:*

1. *Using the* ***bisection method***. *Start with a = 0 and b = 1 and carry out the first three iterations.*

First we must solve for and and inspect their signs:

From this we can see that **f(a) < 0** and **f(b) > 0**.

We must then estimate a numerical solution by finding the midpoint of a and b (bisection).

Using this numerical solution estimate, evaluate the value of the function at this midpoint and inspect the sign.

Since the result of is negative, for the next iteration set a = = 0.5 **since f(a) must be less than 0**.

We then calculate the second iteration now with a = 0.5 and b = 1. First, estimate a numerical solution by finding the midpoint of our new a and b.

Using this numerical solution estimate, evaluate the value of the function at this midpoint and inspect the sign.

Since the result of is negative, for the next iteration set a = = 0.75 **since f(a) must be less than 0**.

We then calculate the third iteration now with a = 0.75 and b = 1. First, estimate a numerical solution by finding the midpoint of our new a and b.

Using this numerical solution estimate, evaluate the value of the function at this midpoint and inspect the sign.

Since the result of is positive, for the next iteration set b = = 0.875 **since f(b) must be more than 0**.

We then calculate the third iteration now with a = 0.75 and b = 0.875. First, estimate a numerical solution by finding the midpoint of our new a and b.

Using this numerical solution estimate, evaluate the value of the function at this midpoint and inspect the sign.

From our three iterations we can estimate that the root of

1. *Using the* ***secant method***. *Start with the two points x1 = 0 and x2 = 1, and carry out the first three iterations.*

Since we are given the two starting points, evaluate the value of at both of these points.

Now, using these points and the identity for a secant containing two points, solve for .

Using this, we then calculate the second iteration using the points and to solve for

Using this, we then calculate the third iteration using the points and to solve for

From our three iterations we can estimate that the root of

1. *Using the* ***Newtons method***. *Start with x = 1 and carry out the first three iterations.*

First we must determine , the derivative of f with respect to x.

Since we are our starting point, evaluate the value of at this point.

Now, using the identity for the slope of a tangent at the point , solve for .

Using the new point , solve for .

Using the new point , solve for .

From our three iterations we can estimate that the root of