| **Faculty of Engineering** **Electrical Engineering Department** **2rd Year** | **Numerical Methods** **Sheet 2** **Binary System & Error Analysis** | |

Problems are from Numerical Methods by John Mathews and Kurtis Fink (Fourth Edition)

A. Programming Exercises (Matlab)

1. Page 62: 2, 3, 4
2. Modify Program 2.2 (Page 99) to use a while loop instead of the for loop.
3. Modify Program 2.2 (Page 99) to make it receive only the function (f) and tolerance (delta). The function should then try to find *a* and *b* automatically.
4. Write a function *findFixedPoint* that uses the function *bisect* to find the fixed point of any function.
5. Write a function *findRoot* that uses *fixpt* to find the zeros of any function

B. Paper Homework

6. Page 50: 3,5
7. Page 51: 9
8. Page 61: 1, 8, 9, 12
9. Page 62: 13
10. Page 37: 1, 2, 3, 8
11. We will invent a new root finding algorithm and call it Assiut Adaptive Approximation (Triple A) Algorithm. It works as follows:

    First you start with one approximation of the root (a) and finds $f(a_0)$ and $f(a_0+h)$ where h is a small positive number. If $f(a_0)*f(a_0+h)>0$ then you set $a_1=a_0+h$ otherwise you set $a_1=a_0-h/2$. This process is iterated until a solution is found:

    a. Does this algorithm work? Justify your answer.
    b. What are the minimum condition for the function f for this algorithm to work if any?
    c. Why did we use $h/2$ in the second case and cannot we just use h?