NUMERICAL METHODS, MAT202E

Homework I (Due March 19)

1- Calculate sin (0.3π) to 8 significant figures using the Maclaurin series expansion of sin(x).

2- There is a root of the equation $f(x) = \ln(x) - \cos(x) - e^{-x}$ that lies between x∈{1,2}.

a) Calculate this root by using the bisection method, the false-position method, the Newton-Raphson method and the secant method with an error tolerance ε_s=0.05%.

b) Can this root be calculated by the simple fixed-point iteration if x=g(x) is selected as:

$$x = \ln(x) - \cos(x) - e^{-x} + x$$

or

$$x = -\ln(x) + \cos(x) + e^{-x} + x$$

Plot each case and show if the iterations will diverge or converge. Then calculate the root.

Present your results in tables:

Iteration	x_l	x_u	x_r	ε_a (%)
1				
2				
.				
.				
.				

i	x_i	ε_a (%)
0		
1		
.		
.		
.		

Note:

- Always use radians for trigonometric functions.
- Writing program codes for the solution of problems is highly recommended (You can use any programming language of your choice).
- You can't use built in functions for the solution of HW questions. You need to either write program codes (advised) or do calculations by hand (not advised, will take a lot of time and effort). There is no third option.
- Present your results in a HW report. If you wrote program codes you need to add them to your submission.
- If you calculated by hand (not advised) use at least 5 significant figures in calculations and present your calculations in your HW report.