

Student's Names	Student's IDs

Question No.	I	II	III	Total
Mark				

**Instructions.**

1. Work on this assignment as groups of three.
2. Use any trusted source of information to handle this assignment with proper citation and no plagiarism.

**[I]**

- (a) Use MATLAB to define and plot the function  $f(x, y) = e^{x^2} + xe^{y^2-x}$ . Evaluate  $f(1, 2)$ .
- (b) Draw the function  $z = \frac{2xy}{x^2+y^2}$  using MATLAB `mesh`, `surf` and `contour3` functions on  $x = 1 : 0.1 : 3$ ,  $y = 1 : 0.1 : 3$ . Explain the difference between the figures.

**[II]**

- (a) Write a MATLAB function for the Bisection Algorithm (Algorithm 2.1 in [1]).
- (b) Use the function in (a) to find the root of  $x^2 + 2 - e^x$  on  $[1, 2]$  with accuracy  $10^{-4}$ .
- (c) Write a MATLAB function for the Secant Algorithm (Algorithm 2.4 in [1]).
- (d) Use the function in (c) to find the root of  $x^2 + 2 - e^x$  on  $[1, 2]$  with accuracy  $10^{-4}$ .
- (e) Compare the number of iterations and the results of (b) and (d).

**[III]**

- (i) Use any Built-in MATLAB function to find the roots of  $x^4 - 2x^2 - x + 1$ .
- (ii) What are the numerical techniques behind the function you used in (i).

[1] Numerical analysis, 9th Edition, Burden and Faires.