King Saud University	**MATH 352 (Numerical Analysis 1)**
Department of Mathematics	**Assignment**
Third Term 1444 H	**To be submitted on or before 3-11-1444**

Student Name	**Student ID**

Question Number	**I**	**II**	**III**	**IV**	**Total**
Mark					

Instructions

- Use any trusted source of information with proper citation and no plagiarism
- Work on this assignment as groups of two

[I] (i) What is MATLAB?

(ii)Use MATLAB to define and plot the function $f(x,y) = \cos(3x) + 2\sin(y + 4x)$.

(iii) Draw the function $z = \sin(y^2) + e^{x^2+y}$ using MATLAB `mesh`, `surf` and `contour3` functions on $x = 0{:}\,0.1{:}\,\pi$, $y = 0{:}\,0.1{:}\,\pi$. Explain the difference between the figures.

[II] For $A = \begin{bmatrix} 1 & 3 & -2 & 0 \\ 2 & 6 & 5 & 2 \\ 0 & 0 & 5 & 10 \\ 2 & 6 & 0 & 8 \end{bmatrix}$ and $\boldsymbol{b} = \begin{bmatrix} 0 \\ -1 \\ 5 \\ 4 \end{bmatrix}$, use MATLAB functions to compute

(a) The Reduced Row Echelon Form of the augmented matrix $[A|\boldsymbol{b}]$.

(b) The solution The solution $\boldsymbol{x}$ of the linear system $A\boldsymbol{x} = \boldsymbol{b}$.

(c) $\det(A)$, A^2, A^T.

[III] (a) Write a MATLAB function for Newton's Algorithm (Algorithm 2.3 in [1]).

(b) Use the function in (a) to find the root of $2x - 3^{-x}$ on $[0,1]$ with accuracy 10^{-5}.

[IV] (i) Use any Built-in MATLAB function to find the roots of $x^4 - 2x^3 - 5x + 1$.

(ii) What are the numerical techniques behind the function you used in (i)?

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

Good Luck ☺