Philadelphia University
Faculty of Engineering
Dept. of Computer Engineering

Student Name:
Student Number

Final Exam (make up) . Second Semester: 2015/2016

Course Title: Engineering Analysis II	**Date: 11/2/2016**
Course No:(630262)	**Time Allowed: 2 hours No. of Pages: 2**

Question 1: (5 marks)
Use false position method to solve the following equation starting with x_L = 1.6 and x_U =1.9 Perform iterations until the relative error is less than 0.01

$$cos^2(x)e^{2x} = 3$$

Question 2: (5 marks)
Use Newton –Raphson method to approximate the solution of the following equation with absolute error less than 0.01, start with x_i=1.

$$f(x) = sin^2(x) - 0.9$$

Question 3: (5 marks)
Perform two Gauss-Seidel iterations to approximate the solution of the following system of linear equations and calculate the relative error in the last iteration.

$$6.2x - 2y - 0.8z = 3.2$$
$$2x + 5.2y - 0.1z = 19.2$$
$$0.5x + 0.3y - 1.2z = -2.9$$

Question 4: (5 marks)
Use 2nd order lagrange interpolation to approximate f(2.1) using the following data:

x	1.6	2.5	3.6
y	2.12	5	12.92

Question 5: (5 marks)
Use Linear Regression to find the relation between x and y, and find SSE for that relation

X	1.3	1.6	1.9	2.3	2.5	2.7
Y	2.1	3.1	4.3	5.7	6.4	7.1

Question 6: (5 marks)

a) Approximate the following integral using composite trapezoidal rule with 7 sampling points

$$\int_0^{\frac{\pi}{2}} \cos\left(\sqrt[3]{2x+3}\right) dx$$

b) What is relative error in the approximation in part (a) if the true solution is:

$$y = 3\sqrt[3]{2x+3}\cos\left(\sqrt[3]{2x+3}\right) + \frac{3}{2}\sqrt[3]{(2x+3)^2}\sin\left(\sqrt[3]{2x+3}\right) - 3\sin\left(\sqrt[3]{2x+3}\right)$$

Question 7: (5 marks)

Use Huen's method to approximate y(3.5) with step size=0.5:

$$\frac{dy}{dx} = -y\cos(x) \qquad y(2) = 0.5$$

Question 8: (5 marks)

1- If $x_i = 3.251$ and $x_{i+1}=3.249$ then relative error for x_{i+1} is:			
A). 6.15×10^{-4}	B). 6.15×10^{-3}	C). 6.15×10^{-2}	D). 6.15×10^{-1}
2- If $f(x)=x^2+5x$ and $x_i=-4$ then using newton raphson method x_{i+1} is:			
A). -5.6667	B). -5.3333	C). -5	D). -4.6667
3- The Eigen values for $\begin{bmatrix} 3 & 1 \\ 2 & 2 \end{bmatrix}$ are:			
A). $\lambda_1=1 \quad \lambda_2=4$	B). $\lambda_1=-1 \quad \lambda_2=4$	C). $\lambda_1=1 \quad \lambda_2=-4$	D). $\lambda_1=-1 \quad \lambda_2=-4$
4- The inverse of $\begin{bmatrix} 4 & 3 \\ 2 & 2 \end{bmatrix}$ is			
A). $\begin{bmatrix} 1 & -1 \\ -1.5 & 2 \end{bmatrix}$	B). $\begin{bmatrix} 1 & -1.5 \\ -1 & 2 \end{bmatrix}$	C). $\begin{bmatrix} 2 & -1.5 \\ -1 & 1 \end{bmatrix}$	D). $\begin{bmatrix} -1.5 & 2 \\ 1 & -1 \end{bmatrix}$
5- Using simple trapezoidal rule for $\int_2^4 (3-2x)dx$ the result is.			
A). -2	B).-4	C).-6	D)-.-8
