



Dept. of Computer Engineering
First Exam, Second Semester: 2017/2018

Course Title: Engineering Analysis II
Course No: (630262)

Date: 9/4/2018
Time Allowed: 50 minutes

NOTES: - Round ALL your calculations to 4 significant digits
- Angles for trigonometric functions are in radian scale

Please choose your section:

Instructor: Dr. Mohammed Mahdi Eng. Anis Nazer Eng. Sultan Al-Rushdan

Lecture time: 9:10 ح خ 11:10 ح خ 13:10 ح خ 9:45 ن ر

Question 1: _____ **(20 marks)**

Choose the correct answer in the following questions

Question	Answer
1) If an approximation is correct for 4 significant digits, then the relative error in the approximation is less than _____ A) 0.05 B) 0.005 C) 0.0005 D) 0.00005	
2) Assume that $[X]=\begin{bmatrix} 1 \\ 1 \end{bmatrix}$, $[Y]=\begin{bmatrix} 1 & 1 \end{bmatrix}$ then $[X][Y]=$ A) $\begin{bmatrix} 2 \end{bmatrix}$ B) $\begin{bmatrix} 1 \\ 1 \end{bmatrix}$ C) $\begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$ D) the multiplication is invalid	
3) Assume that $[B]=[A]^{-1}$ and $[C]=[A][B]$, then $c_{32}=?$ A) 0 B) 1 C) 32 D) cannot be determined	
4) Which of the following matrices is singular (has a determinant of zero) ? A) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ B) $\begin{bmatrix} 3 & -6 \\ 2 & 4 \end{bmatrix}$ C) $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ D) None of the choices	

Question 2: _____ **(30 marks)**

Consider the following equation

$$f(x) = \sin(x^2) - 0.5$$

- a) Write $f'(x)$
- b) Perform three Newton-Raphson iterations to solve for $f(x) = 0$. Start with $x = 1$, and approximate the solution with an absolute error less than 0.01

Question 3: _____ **(30 marks)**

Approximate the solution of the system below using **two** Gauss-Seidel iterations starting with $a = 5$, $b = -2$, $c = -1$, and find the relative error in the last iteration

$$\begin{bmatrix} 5 & -1 & -3 \\ -2 & -6 & 1 \\ 3 & -3 & 8 \end{bmatrix} \begin{bmatrix} a \\ b \\ c \end{bmatrix} = \begin{bmatrix} 61.9 \\ 25.9 \\ 51.2 \end{bmatrix}$$

Question 4: _____ **(20 marks)**

A bank uses the formula below to calculate the yearly payment for a loan.

$$A = P \frac{i(1+i)^n}{(1+i)^n - 1}$$

where:

A is the yearly payment

P is the value of the loan

i is the interest rate

n is the number of years

Assume you took a loan for 15000 JOD and you pay 2500 JOD per year for 8 years. Use bisection method to approximate the interest rate for this loan, start with i between 0.05 and 0.15 and perform 4 iterations