



Fayoum University
Faculty of Engineering
2nd year civil. Eng.
Department of civil eng.



Final Exam of:
Numerical analysis 1 (MTH201)

Date: Oct.-Jan. 2015/2016
Allowed time: 3Hrs.

Question 1.

(10-points)

Find the value of k for which the system

$$x + ky + 2z = k, \quad kx + 4y + 4z = 4, \quad kx + 4y + kz = -2$$

has (a) unique solution, (b) More than one solution, (c) No solution

Question 2.

(a)- Find the eigenvalues and eigenvectors of the matrix A (6-points)

(b)- Find the eigenvalues and Determinant of the matrix $A^3 + 10I$ (2-points)

(c) - compute e^A (6-points)

(d)- Find the inverse of matrix B (5-points)

$$A = \begin{pmatrix} 1 & 2 & 3 \\ 0 & 1 & 6 \\ 0 & 2 & 2 \end{pmatrix}, \quad B = \begin{pmatrix} 1 & 0 & 2 \\ 2 & 1 & 4 \\ 0 & 1 & 1 \end{pmatrix}$$

Question 3.

(a) Explain how to fit the curves

(3-points)

i) $y = \sin(a+bx)$ ii) $y = \ln 10 - \ln(c+dx)$ iii) $y = a10^{bx}$

(Show how to find the coefficient a, b, c and d without calculation)

(b) Fit the curve $y = a+bx+cx^2$ for the following readings, (1, 3.2), (2, 4.6), (5, 12) (10-points)

and (9, 18.5) then find (a) y and y' when $x = 2.4$ (b) The root mean squares of errors

(R.M.S)

Question 4.

(a) Use two different interpolation formulas to find y when $x=2$

(10-points)

by using the readings (0,2), (1,4), (3,10), and (6,18).

(b) Compute $y(1.88)$, $y'(2.05)$ and $y(2.15)$ using a suitable interpolation method from the following table (10-points)

x	1.8	1.9	2	2.1	2.2
y	10.8	12.7	14.8	17.2	20

Question 5.

(8-points)

Use Runge-Kutta of order two method to find y , y' and y'' when $x=0.2$ if

$$y'' = x^2 - y^2 + 2y \quad \text{and} \quad y(0)=2 \quad \text{and} \quad y'(0)=2$$

Best Wishes Dr. Ibrahim Hamdy