Department of Higher Education
University of Computer Studies, Yangon
Third Year(B.C.Sc. / B.C.Tech.)
Final Examination
Mathematics of Computing III (CST-302)
September, 2018

Answer ALL questions. **Time allowed : 3 hours.**

1(a) Solve by Cramer's rule. Check by Gauss elimination and back substitution.

$$3x - 2y + z = 13$$
$$-2x + y + 4z = 11$$
$$x + 4y - 5z = -31$$

(b) Find the rank of the matrix, $\begin{bmatrix} 6 & -4 & 0 \\ -4 & 0 & 2 \\ 0 & 2 & 6 \end{bmatrix}$. Is the set of vectors linearly independent?

2. Find and sketch disks or intervals that contain the eigenvalues by Gerschgorin's Theorem. And then also find the eigenvalues and compare. Find the corresponding eigenvectors.

$$A = \begin{bmatrix} 6 & 2 & -2 \\ 2 & 5 & 0 \\ -2 & 0 & 7 \end{bmatrix}$$

3(a) (i) Compute the Newton's Backward difference table for the tabulated function.

(ii) Write down the Newton's polynomial, $p_3(x)$.

(iii) Evaluate the Newton's polynomial $p_3(x)$ at the given values of x.

(iv) Compare the values in (iii) with the actual function values, $f(x)$.

$f(x) = \frac{3.6}{x}$, $x = 2.5, 3.5$

j	x_j	$f(x_j)$
0	1.0	3.60
1	2.0	1.80
2	3.0	1.20
3	4.0	0.90

(b) Solve by fixed-point iteration of $x^4 - x - 0.12 = 0$ starting from $x_0 = 1$. (6D-accuracy)

4(a) Evaluate the integral, $B = \int_0^{0.4} xe^{-x^2}\,dx$, 2m=8 by Simpson's rule. (6D-accuracy)

(b) Compute the matrix norm and the condition number corresponding to the l_1-vector norm.

$$\begin{bmatrix} \sqrt{5} & 5 \\ 0 & -\sqrt{5} \end{bmatrix}$$

5(a) Solve the linear systems of equations by Gauss-Seidel iteration. Do 5 steps, starting from $x_0 = [1 \quad 1 \quad 1]^T$ and using 6S in the computation.

$$3x_1 + 2x_2 + x_3 = 7$$
$$x_1 + 3x_2 + 2x_3 = 4$$
$$2x_1 + x_2 + x_3 = 7$$

Write an algorithm or MATLAB program for Gauss-Seidel Iteration.

(b) Fit a straight line to the given points (x, y) by least squares.

(9, 140), (10, 220), (11, 310), (12, 410)

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