# National University

**of Computer & Emerging Sciences Peshawar Campus**

Program: BS ( CS )
Semester: Fall-2019
Course: MT104-Linear Algebra
Instructor Name: Mr. Osama Sohrab

Examination: Assignment # 03
Total Marks: 10, Weightage: **03**
Date of Submission: 28 / 10 / 2019
Batch : 18

**Note: Attempt all questions.**

Q1.

Write the vector $\mathbf{w} = (1, 1, 1)$ as a linear combination of vectors in the set $S$.

$S = \{(1, 2, 3), (0, 1, 2), (-1, 0, 1)\}$

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Q2.

Determine whether the following polynomials span $P_2$.

$$\mathbf{p}_1 = 1 - x + 2x^2, \quad \mathbf{p}_2 = 3 + x,$$
$$\mathbf{p}_3 = 5 - x + 4x^2, \quad \mathbf{p}_4 = -2 - 2x + 2x^2$$

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Q3.

Show that the vectors $v_1 = (-1, 3, 2),\ v_2 = (1, -2,\ 1), v_3 = (2, 1, 1)$ span $\mathbb{R}^3$ and express $v = (a,\ b, c)$ as a linear combination of $v_1, v_2$ and $v_3$.

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Q4.

Check the dependency of the following three vectors in $M_{22}$

$$A = \begin{bmatrix} 1 & -1 \\ 4 & 5 \end{bmatrix},\ B = \begin{bmatrix} 4 & 3 \\ -2 & 3 \end{bmatrix},\ C = \begin{bmatrix} 1 & -8 \\ 22 & 23 \end{bmatrix}.$$

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Q5.

Which of the following set of vectors in $P_2$ are linearly independent?

$S = \{2 - x + 4x^2, \quad 3 + 6x + 2x^2, \quad 2 + 10x - 4x^2\}$

$H = \{3 + x + x^2, \quad 2 - x + 5x^2, \quad 4 - 3x^2\}$

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**The End**