National University of Computer and Emerging Sciences, Lahore Campus				
	Course:	Linear Algebra	Course Code:	MT-1004
	Program:	BS(CS)/BS(DS)/ BS(SE)	Semester:	Fall 2022
	Duration:	60 mins	Total Marks:	30
	Date:	10-11-2022	Weight:	12.5%
	Section:	All	Page(s):	1
	Exam:	MID-2	Roll No:	
Name:				

Instruction/Notes: Attempt all questions. If you believe that some essential piece of information is missing, make an appropriate assumption and use it to solve the problem. Use of programmable calculators is not allowed. Attempt all questions in order. Best of luck!

(-2,0,0) · 20

Question no. 1: (5+5 marks) (CLO #02)

(6,0,3) (4,6,3)

a) Find the vector and parametric equation of the plane in R^3 that passes through the origin and is orthogonal to vector $v = (3,1,-6)$.

b) Find the distance between the given parallel planes

$$7x - 3y - 6 = 5z \text{ and } x = \frac{1}{3}z + \frac{1}{6}y - 2.$$

$\frac{20}{\sqrt{83}}$

$-\frac{6}{5} = 7$

$-\frac{1}{3}\left(-\frac{6}{5}\right) + 2$

$12 + \left(\frac{1}{3}\right)^2 + \left(\frac{1}{6}\right)^2$

Question no. 2: (6+4 marks) (CLO #02)

a) Check that whether the set of all ordered pairs of real numbers with the standard vector addition but with scalar multiplication defined by $k(x,y) = (2kx, 2ky)$ form the vector space or not. And if the given set is not a vector space, then identify the vector space axioms that fail with complete working.

fails

b) Consider the vector space R^3 under usual addition and scalar multiplication. Check that whether the set $S = \{(a,b,c),\ where\ c = a - b\}$ forms a subspace in R^3 or not?

$\frac{12}{5}$

$\frac{\sqrt{41}}{6}$

Question no. 3: (5+5 marks) (CLO #02)

For the following vectors in R^3

$$v_1 = (3,1,-4), \quad v_2 = (2,5,6), \quad v_3 = (1,4,8)$$

2.25 - 2.2

a) Check that given vectors are linearly independent or not by using definition.

b) Determine whether the given vectors span R^3.

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Note: Any other method used to find the Linear independence will not be considered for marking. Show complete working.

4(3) 1(6) -6(3)