

Name: SOLUTIONS

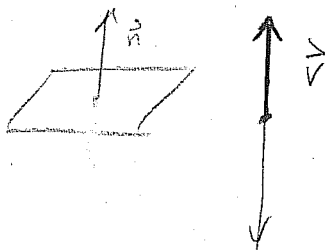
Student ID: _____

Quiz 11

Question 1. (4 marks) Find the equation of the line passing through the point $P(1, 1, 4)$ and perpendicular to the plane $-3x + 5y - 7 = 0$.

$$\vec{n}_1 = (-3, 5, 0) = \vec{v} \text{ DIRECTION VECTOR FOR THE LINE.}$$

$$(x, y, z) = (1 - 3t, 1 + 5t, 4) \quad t \in \mathbb{R}$$



Question 2. (6 marks) Find the distance between the planes $2x - y + 6z + 4 = 0$ and $-4x + 2y - 12z - 2 = 0$.

$P_1(0, -4, 0)$ IS ON PLANE ①, $P_2(0, 1, 0)$ IS ON PLANE 2.

$\vec{n}_1 = (2, -1, 6)$ IS A NORMAL VECTOR

$$\vec{P_1 P_2} = (0, 5, 0)$$

$$\text{Proj}_{\vec{n}_1} \vec{P_1 P_2} = \frac{(0, -4, 0) \cdot (2, -1, 6)}{(2, -1, 6) \cdot (2, -1, 6)} = \frac{4}{41} (2, -1, 6)$$

$$\text{DISTANCE} = \|\text{Proj}_{\vec{n}_1} \vec{P_1 P_2}\| = \left\| \frac{4}{41} (2, -1, 6) \right\|$$

$$= \left| \frac{4}{41} \right| \|(2, -1, 6)\| = \frac{4}{41} \sqrt{(2)^2 + (-1)^2 + (6)^2}$$

$$= \frac{4}{41} \sqrt{41}$$

$$\text{OR} = \left\| \left(\frac{8}{41}, \frac{-4}{41}, \frac{24}{41} \right) \right\| = \sqrt{\frac{654}{(41)^2}} = \sqrt{\frac{16}{41}} = \frac{4}{\sqrt{41}}$$