Math 2433-001 Quiz 3 Name: SOLUTIONS

Q1].. Find the equation of the plane which contains the point $(1, -2, 1)$ and which is perpendicular to the planes $x + 3y - 2z + 17 = 0$ and $2x + y + 3z = 45$.

For plane, need $\begin{cases} \bullet \text{ Point } \checkmark \ (1, -2, 1) \\ \bullet \text{ Normal vector } \vec{N} \end{cases}$

$x + 3y - 2z + 17 = 0$ has Normal $\vec{N}_1 = \langle 1, 3, -2 \rangle$

$2x + y + 3z = 45$ has Normal $\vec{N}_2 = \langle 2, 1, 3 \rangle$

Our desired plane will be parallel to both $\vec{N}_1$ and $\vec{N}_2$

$\Rightarrow$ we can take $\vec{N} = \vec{N}_1 \times \vec{N}_2$ as normal

$$= \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 1 & 3 & -2 \\ 2 & 1 & 3 \end{vmatrix}$$

$$= \langle 11, -7, -5 \rangle$$

So eqn is $\vec{N} \cdot \langle x-1, y-(-2), z-1 \rangle = 0$

$$\boxed{11(x-1) - 7(y+2) - 5(z-1) = 0}$$