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, we need \[ \begin{cases} \text{• Point } & (1, -2, 1) \\ \text{• Normal Vector } & \vec{N} \end{cases} \]

$x + 3y - 2z + 17 = 0$ 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 $\vec{N}_2$

\[ \Rightarrow \text{we can take } \vec{N} = \vec{N}_1 \times \vec{N}_2 \text{ as normal} \]

\[ \vec{N} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 1 & 3 & -2 \\ 2 & 1 & 3 \end{vmatrix} \]

\[ = \langle 11, -7, -5 \rangle \]

So e.g. is $\vec{N} \cdot (x-1, y-2, z-1) = 0$

\[ 11(x-1) - 7(y+2) - 5(z-1) = 0 \]