

Question 5: If for some $\alpha \in \mathbb{R}$, the lines $L_1 : (x+1)/2 = (y-2)/-1 = (z-1)/1$ and $L_2 : (x+2)/\alpha = (y+1)/(5-\alpha) = (z+1)/1$ are coplanar, then the line L_2 passes through the point:

- (a) (2, -10, -2)
- (b) (10, -2, -2)
- (c) (10, 2, 2)
- (d) (-2, 10, 2)

Solution:

$$A(-1,2,1), B(-2,-1,-1)$$

$$\left[\begin{array}{ccc} \vec{AB} & \vec{b}_1 & \vec{b}_2 \end{array} \right] = 0$$

$$\begin{vmatrix} -1 & -3 & -2 \\ 2 & -1 & 1 \\ \alpha & 5-\alpha & 1 \end{vmatrix} = 0$$

$$-1(-1+\alpha-5)+3(2-\alpha)-2(10-2\alpha+\alpha) = 0$$

$$6-\alpha+6-3\alpha+2\alpha-20 = 0$$

$$-8-2\alpha = 0$$

$$\alpha = -4$$

$$L_2: (x+2)/-4 = (y+1)/9 = (z+1)/1$$

Check options. (2, -10, -2) satisfies above equation.

Hence option a is the answer.