$$\text{Let } \vec{a} = \begin{bmatrix} 1 \\ -1 \\ 2 \end{bmatrix} \quad \vec{b} = \begin{bmatrix} -1 \\ 2 \\ 1 \end{bmatrix} \quad \vec{c} = \begin{bmatrix} -2 \\ 3 \\ 1 \end{bmatrix} \quad \vec{d} = \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$$

1. Find the angle between $\vec{a}$ and $\vec{b}$.
2. Find the angle between L_1 and L_2, where $L_1 : \vec{r} = \vec{c} + \lambda\vec{a}$ and $L_2 : \vec{r} = \vec{d} + \lambda\vec{b}$.
3. Let π_1 be the plane defined by the Cartesian equation $x - 3y + z = 2$. Find the angle between L_1 and π_1.
4. Let π_2 be the plane defined by the Cartesian equation $2x + y - z = 0$. Find the angle between π_1 and π_2.