

12.11.4.3

Question : Find the angle between the lines whose direction ratios are a, b, c and $b - c, c - a, a - b$.

Solution :

$$\mathbf{m}_1 = \begin{pmatrix} a \\ b \\ c \end{pmatrix} \quad (1)$$

$$\mathbf{m}_2 = \begin{pmatrix} b - c \\ c - a \\ a - b \end{pmatrix} \quad (2)$$

$$\cos \theta = \frac{\mathbf{m}_1^\top \mathbf{m}_2}{||\mathbf{m}_1|| ||\mathbf{m}_2||} \quad (3)$$

$$= \frac{(a \ b \ c) \begin{pmatrix} b - c \\ c - a \\ a - b \end{pmatrix}}{\sqrt{a^2 + b^2 + c^2} \sqrt{(b - c)^2 + (c - a)^2 + (a - b)^2}} \quad (4)$$

$$= 0 \quad (5)$$

$$\text{or, } \theta = \frac{\pi}{2} \quad (6)$$