

Exemplar Problem

Three Dimensional Geometry

44. The angle between the line

$$\underline{r} = (5\hat{i} - \hat{j} - 4\hat{k}) + \lambda (2\hat{i} - \hat{j} + \hat{k})$$

and the plane

$$\underline{r} (3\hat{i} - 4\hat{j} - \hat{k}) + 5 = 0$$

is

$$\sin^{-1} \left(\frac{5}{2\sqrt{91}} \right)$$

Ans: We have $\underline{b} = 2\hat{i} - \hat{j} + \hat{k}$ and $\underline{n} = 3\hat{i} - 4\hat{j} - \hat{k}$

The angle b/w a line and plane is $\sin\theta = \frac{\underline{b} \cdot \underline{n}}{|\underline{b}| \cdot |\underline{n}|} = \frac{6+4-1}{\sqrt{2^2+1+1}\sqrt{3^2+4^2+1}} = \frac{9}{\sqrt{6} \cdot \sqrt{26}} = \frac{9}{2\sqrt{39}}$

$$\theta = \sin^{-1} \left(\frac{9}{2\sqrt{39}} \right)$$

Thus the statement is false.