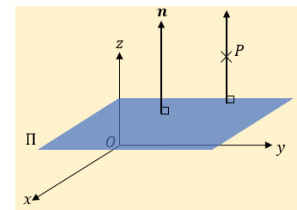
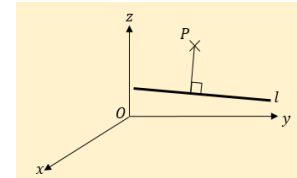
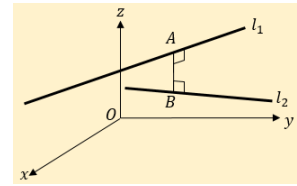


9F Part 1 Perpendicular Distances with Lines



1. Show that the shortest distance between the parallel lines with equations:

$$r = i + 2j - k + \lambda(5i + 4j + 3k)$$

and

$$r = 2i + k + \mu(5i + 4j + 3k)$$

is $\frac{21\sqrt{2}}{10}$

2. The lines l_1 and l_2 have equations:

$$\mathbf{r} = \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix} + \lambda \begin{pmatrix} 0 \\ 1 \\ 1 \end{pmatrix}$$

$$\mathbf{r} = \begin{pmatrix} -1 \\ 3 \\ -1 \end{pmatrix} + \mu \begin{pmatrix} 2 \\ -1 \\ -1 \end{pmatrix}$$

Find the shortest distance between these two lines.

3. The line l has equation:

$$\frac{x - 1}{2} = \frac{y - 1}{-2} = \frac{z + 3}{-1}$$

The point A has coordinates $(1, 2, -1)$

a) Find the shortest distance between A and l .

b) Find a Cartesian equation of the line that is perpendicular to l , and passes through A .