**9F Part 1 Perpendicular Distances with Lines**







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

$$r=i+2j-k+λ(5i+4j+3k)$$

and

$$r=2i+k+μ(5i+4j+3k)$$

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

1. The lines $l\_{1}$ and $l\_{2}$ have equations:

$$r=\left(\begin{matrix}1\\0\\0\end{matrix}\right)+λ\left(\begin{matrix}0\\1\\1\end{matrix}\right)$$

$$r=\left(\begin{matrix}-1\\3\\-1\end{matrix}\right)+μ\left(\begin{matrix}2\\-1\\-1\end{matrix}\right)$$

Find the shortest distance between these two lines.

1. The line $l$ has equation:

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

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

1. Find the shortest distance between $A$ and $l$.
2. Find a Cartesian equation of the line that is perpendicular to $l$, and passes through $A$.