**9A Part 2 Cartesian 3D Lines**

1. With respect to the fixed origin O, the line $l$ is given by the equation:

$$r=\left(\begin{matrix}a\_{1}\\a\_{2}\\a\_{3}\end{matrix}\right)+λ\left(\begin{matrix}b\_{1}\\b\_{2}\\b\_{3}\end{matrix}\right)$$

Prove that a Cartesian form of the equation of $l$ is:

$$\frac{x-a\_{1}}{b\_{1}}=\frac{y-a\_{2}}{b\_{2}}=\frac{z-a\_{3}}{b\_{3}}$$

1. Find a Cartesian equation of the line with equation:

$$r=\left(\begin{matrix}4\\3\\-2\end{matrix}\right)+λ\left(\begin{matrix}-1\\2\\5\end{matrix}\right)$$

1. The line $l$ has equation:

$$r=\left(\begin{matrix}-2\\1\\4\end{matrix}\right)+λ\left(\begin{matrix}1\\-2\\1\end{matrix}\right)$$

The point $P$ has position vector:

$$\left(\begin{matrix}2\\1\\3\end{matrix}\right)$$

1. Show that $P$ does not line on $l$
2. Given that a circle, centre $P$, intersects $l$ at points $A$ and $B$, and that $A$ has position vector:

$$A=\left(\begin{matrix}0\\-3\\6\end{matrix}\right)$$

Find the position vector of $B$.