Edexcel A Level FM Revision Questions

Matrices and Vectors

Question 1

Find the invariant points and lines for the transformation represented by the matrix $\begin{pmatrix} 5 & 4 \\ -4 & -3 \end{pmatrix}$

Question 2

Show that the following three planes meet in a line, giving the equation of that line in cartesian form.

$x - y + 3z = 4$

$4x + 5y - 2z = 8$

$x + 17y - 25z = -12$

Question 3

(i) (a) Find the acute angle between the line $\frac{x}{2} = \frac{y+1}{-3} = \frac{z-2}{1}$ and the plane $x + y - 2z = 5$

(b) Show that the same angle is obtained if the line is written in the form $\frac{x}{-2} = \frac{y+1}{3} = \frac{z-2}{-1}$ (i.e. without rearranging into the form in (a))

(ii) (a) Find the acute angle between the planes $x + 4y - 3z = 7$ and $x - y + 4z = 2$.

(b) Find the acute angle between the planes $x + 4y - 3z = 7$ and $-x + y - 4z = 2$ (again, without rearranging the equation)

Question 4

Find the line that is the reflection of the line $\frac{x-2}{3} = \frac{y}{4} = \frac{z+1}{1}$ in the plane $x - 2y + z = 4$.

Question 5

Find the distance between the line $\frac{x+1}{1} = \frac{y+2}{2}; z = 4$ and the line $\frac{x+3}{1} = \frac{y-6}{2}; z = 7$, leaving your answer in exact form.

Question 6

(i) Show that the lines $\frac{x-1}{2}=\frac{y+3}{5}=\frac{z-2}{3}$ and $\frac{x}{1}=\frac{y-4}{2}=\frac{z+1}{2}$ are skew.

(ii) Find the shortest distance between the lines and identify the points on the lines at which this shortest distance occurs.