AQA – Matrices – A2 Further Mathematics P1

1. June/2021/Paper_7367/1/No.12

The matrix $\mathbf{A} = \begin{bmatrix} 1 & 5 & 3 \\ 4 & -2 & p \\ 8 & 5 & -11 \end{bmatrix}$, where p is a constant.

(a) Given that $\mathbf{A}$ is a non-singular matrix, find $\mathbf{A}^{-1}$ in terms of p.

State any restrictions on the value of p.

[6 marks]

(b) The equations below represent three planes.

$$\begin{aligned} x + 5y + 3z &= 5 \\ 4x - 2y + pz &= 24 \\ 8x + 5y - 11z &= -30 \end{aligned}$$

(b) (i) Find, in terms of p, the coordinates of the point of intersection of the three planes.

[4 marks]

(b) (ii) In the case where $p = 2$, show that the planes are mutually perpendicular.

[4 marks]

2. June/2021/Paper_7367/1/No.13

The transformation S is represented by the matrix $\begin{bmatrix} 3 & 0 \\ 0 & 1 \end{bmatrix}$

The transformation T is a translation by the vector $\begin{bmatrix} 0 \\ -5 \end{bmatrix}$

Kamla transforms the graphs of various functions by applying first S, then T.

Leo says that, for some graphs, Kamla would get a different result if she applied first T, then S.

Kamla disagrees.

State who is correct.

Fully justify your answer.

[3 marks]