



Y1 Matrices – 3x3 Determinants and Inverses Exam Questions (Edexcel)

Q1.

$$\mathbf{A} = \begin{pmatrix} -2 & 1 & -3 \\ k & 1 & 3 \\ 2 & -1 & k \end{pmatrix}, \text{ where } k \text{ is a constant}$$

Given that the matrix \mathbf{A} is singular, find the possible values of k .

(4)

(Total for question = 4 marks)

(Q07 6669/01, June 2016)

Q2.

(i) \mathbf{A} is a 2 by 2 matrix and \mathbf{B} is a 2 by 3 matrix.

Giving a reason for your answer, explain whether it is possible to evaluate

(a) \mathbf{AB}

(b) $\mathbf{A} + \mathbf{B}$

(2)

(ii) Given that

$$\begin{pmatrix} -5 & 3 & 1 \\ a & 0 & 0 \\ b & a & b \end{pmatrix} \begin{pmatrix} 0 & 5 & 0 \\ 2 & 12 & -1 \\ -1 & -11 & 3 \end{pmatrix} = \lambda \mathbf{I}$$

where a , b and λ are constants,

(a) determine

- the value of λ
- the value of a
- the value of b

$$\begin{pmatrix} -5 & 3 & 1 \\ a & 0 & 0 \\ b & a & b \end{pmatrix}$$

(b) Hence deduce the inverse of the matrix

(3)

(iii) [Note: This question requires knowledge of Year 2 A Level Maths double angle formulae]

Given that

$$\mathbf{M} = \begin{pmatrix} 1 & 1 & 1 \\ 0 & \sin \theta & \cos \theta \\ 0 & \cos 2\theta & \sin 2\theta \end{pmatrix} \quad \text{where } 0 \leq \theta < \pi$$

determine the values of θ for which the matrix \mathbf{M} is singular.

(4)

(Total for question = 9 marks)

(Q04 9FM0/01, Oct 2021)



Q3.

$$\mathbf{M} = \begin{pmatrix} a & 2 & -3 \\ 2 & 3 & 0 \\ 4 & a & 2 \end{pmatrix} \quad \text{where } a \text{ is a constant}$$

(a) Show that \mathbf{M} is non-singular for all values of a .

(2)

(b) Determine, in terms of a , \mathbf{M}^{-1}

(4)

(Total for question = 6 marks)

(Q05 9FM0/01, June 2022)

Q4.

$$\mathbf{P} = \begin{pmatrix} k & -2 & 7 \\ -3 & -5 & 2 \\ k & k & 4 \end{pmatrix} \quad \text{where } k \text{ is a constant}$$

Show that \mathbf{P} is non-singular for all real values of k .

(4)

(Total for question = 4 marks)

(Q09 8FM0/01, June 2023)

Q5.

(i)

$$\mathbf{M} = \begin{pmatrix} 2 & a & 4 \\ 1 & -1 & -1 \\ -1 & 2 & -1 \end{pmatrix}$$

where a is a constant.

(a) For which values of a does the matrix \mathbf{M} have an inverse?

(2)

Given that \mathbf{M} is non-singular,

(b) find \mathbf{M}^{-1} in terms of a

(4)

(Total for question = 6 marks)

(Q03 9FM0/02, Specimen papers)