



Matrices – Solving Simultaneous Equations Exam Questions (Edexcel)

Q1.

$$\mathbf{M} = \begin{pmatrix} 2 & 1 & -3 \\ 4 & -2 & 1 \\ 3 & 5 & -2 \end{pmatrix}$$

(a) Find \mathbf{M}^{-1} giving each element in exact form.

(2)

(b) Solve the simultaneous equations

$$2x + y - 3z = -4$$

$$4x - 2y + z = 9$$

$$3x + 5y - 2z = 5$$

(2)

(c) Interpret the answer to part (b) geometrically.

(1)

(Total for question = 5 marks)

(Q01 8FM0/01, June 2018)

Q2.

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

$$\mathbf{N} = \begin{pmatrix} k - 7 & 6 & -10 \\ 2 & -20 & 24 \\ -3 & 2 & -1 \end{pmatrix}$$

where k is a constant.

(a) Determine, in simplest form in terms of k , the matrix $\mathbf{M N}$.

(2)

(b) Given that $k = 5$

(i) write down $\mathbf{M N}$

(ii) hence write down \mathbf{M}^{-1}

(2)

(c) Solve the simultaneous equations

$$2x + y + 4z = 2$$

$$5x + 2y - 2z = 3$$

$$4x + y - 2z = -1$$

(2)

(d) Interpret the answer to part (c) geometrically.

(1)

(Total for question = 7 marks)

(Q04 8FM0/01, Oct 2021)



Q3.

$$\mathbf{M} = \begin{pmatrix} 2 & -1 & 1 \\ 3 & k & 4 \\ 3 & 2 & -1 \end{pmatrix} \quad \text{where } k \text{ is a constant}$$

(a) Find the values of k for which the matrix \mathbf{M} has an inverse.

(2)

(b) Find, in terms of p , the coordinates of the point where the following planes intersect

$$2x - y + z = p$$

$$3x - 6y + 4z = 1$$

$$3x + 2y - z = 0$$

(5)

(c) (i) Find the value of q for which the set of simultaneous equations

$$2x - y + z = 1$$

$$3x - 5y + 4z = q$$

$$3x + 2y - z = 0$$

can be solved.

(ii) For this value of q , interpret the solution of the set of simultaneous equations geometrically.

(4)

(Total for question = 11 marks)

(Q07 9FM0/02, June 2019)

Q4. (In this question you must show all stages of your working.)

A college offers only three courses: Construction, Design and Hospitality.

Each student enrolls on just one of these courses.

In 2019, there was a total of 1110 students at this college.

There were 370 more students enrolled on Construction than Hospitality.

- Construction **increased** by 1.25%
- Design **increased** by 2.5%
- Hospitality **decreased** by 2%

In 2020, the total number of students at the college increased by 0.27% to 2 significant figures.

(a) (i) Define, for each course, a variable for the number of students enrolled on that course in 2019.

(ii) Using your variables from part (a)(i), write down **three** equations that model this situation.

(4)

(b) By forming and solving a matrix equation, determine how many students were enrolled on each of the three courses in 2019.

(4)

(Total for question = 8 marks)

(Q02 9FM0/02, June 2022)

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Q5.

Tyler invested a total of £5000 across three different accounts; a savings account, a property bond account and a share dealing account.

Tyler invested £400 more in the property bond account than in the savings account.

After one year

- the savings account had increased in value by 1.5%
- the property bond account had increased in value by 3.5%
- the share dealing account had **decreased** in value by 2.5%

- the total value across Tyler's three accounts had increased by £79

Form and solve a matrix equation to find out how much money was invested by Tyler in each account.

(7)

(Total for question = 7 marks)

(Q03 8FM0/01, Specimen papers)

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