

MATRICES PAST PAPER QUESTIONS
REDUCTION TO ECHELON FORM
GENERAL SOLUTIONS OF SYSTEMS OF LINEAR EQUATIONS

JUNE 2008

- (a) Use reduction to echelon form to find the value of k for which the following equations are consistent.

$$\begin{aligned}2x + y + 3z &= 5 \\ x - 2y + 2z &= 6 \\ 4x + 7y + 5z &= k\end{aligned}\quad [5]$$

- (b) For this value of k , find the general solution to these equations. [3]

JAN 2008

Solve the following equations by reduction to echelon form.

$$\begin{aligned}x + 3y + 2z &= 14 \\ 2x + y + z &= 7 \\ 3x + 2y - z &= 7\end{aligned}\quad [7]$$

JUNE 2007

- (a) Show that the matrix A defined below is singular.

$$A = \begin{bmatrix} 2 & 1 & 2 \\ 3 & 4 & 1 \\ 1 & 8 & -5 \end{bmatrix}\quad [3]$$

- (b) (i) Find the value of k for which the following equations are consistent.

$$\begin{aligned}2x + y + 2z &= 3 \\ 3x + 4y + z &= 1 \\ x + 8y - 5z &= k\end{aligned}$$

- (ii) For this value of k , find the general solution of these equations. [9]

JAN 2007

Consider the simultaneous equations

$$\begin{aligned}x + 2y - z &= 2 \\ 2x - y + z &= 3 \\ 4x - 7y + 5z &= 5.\end{aligned}$$

Given that these equations do not have a unique solution,

- (a) show that the equations are consistent. [4]

- (b) find the general solution to the equations. [3]

JUNE 2006

Use reduction to echelon form to solve the equations

$$\begin{bmatrix} 1 & 3 & 2 \\ 2 & 1 & 1 \\ 3 & 2 & -1 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 13 \\ 7 \\ 4 \end{bmatrix}. \quad [7]$$

JAN 2006

Consider the system of equations:

$$\begin{bmatrix} 2 & 5 & 3 \\ 1 & 2 & 2 \\ 1 & 1 & \lambda \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 2 \\ 4 \\ \mu \end{bmatrix}$$

- (a) Use reduction to echelon form to find the value of λ for which the equations do not have a unique solution. [5]
- (b) For this value of λ , find the value of μ for which the equations are consistent. Find the general solution of the equations in this case. [5]

Specimen FP1 2005

- (a) Find the value of λ for which the following matrix is singular.

$$\begin{bmatrix} 1 & 1 & 2 \\ 1 & 2 & 1 \\ \lambda & 1 & 5 \end{bmatrix} \quad [3]$$

- (b) (i) Find the value of μ for which the following system of equations is consistent.

$$\begin{bmatrix} 1 & 1 & 2 \\ 1 & 2 & 1 \\ 2 & 1 & 5 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 2 \\ 2 \\ \mu \end{bmatrix}$$

- (ii) For this value of μ , find the general solution to this system of equations. [8]

P5 JUNE 2004

Consider the following set of equations

$$\begin{aligned} x + y + 2z &= 8 \\ 2x + y - z &= 3 \\ x - y - 8z &= k \end{aligned}$$

where k is a real constant.

- (a) Show, by reduction to echelon form, that these equations do not have a unique solution. [4]
- (b) Find the value of k for which the equations are consistent. [1]
- (c) For the value of k found in (b), find the general solution to these equations. [4]