

Advanced Higher Maths

Systems of Equations

2001

Use Gaussian Elimination to solve the following system of equations.

$$x + y + z = 10$$

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

$$x + 2z = 20$$

(5 marks)

2002

Use Gaussian Elimination to solve the following system of equations.

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

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

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

(5 marks)

2003

Use elementary row operations to reduce the following system of equations to upper triangular form.

$$x + y + 3z = 1$$

$$3x + ay + z = 1$$

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

Hence express x , y and z in terms of the parameter a .

Explain what happens when $a = 3$.

(2, 2, 2 marks)

2005

Use Gaussian Elimination to solve the system of equations below when $\lambda \neq 2$.

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

$$2x + \lambda y + z = 0$$

$$3x + 3y + 9z = 5$$

Explain what happens when $\lambda = 2$.

(4, 2 marks)

2006

Use Gaussian elimination to obtain solutions of the equations

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

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

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

(5 marks)

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2009

Use Gaussian elimination to solve the following system of equations

$$\begin{aligned}x + y - z &= 6 \\2x - 3y + 2z &= 2 \\-5x + 2y - 4z &= 1\end{aligned}$$

(5 marks)

2010

Use Gaussian elimination to show that the set of equations

$$\begin{aligned}x - y + z &= 1 \\x + y + 2z &= 0 \\2x - y + az &= 2\end{aligned}$$

has a unique solution when $a \neq 2 \cdot 5$.

Explain what happens when $a = 2 \cdot 5$.

Obtain the solution when $a = 3$.

(5, 1, 1 marks)

2012

Use Gaussian elimination to obtain the solution of the following system of equations in terms of the parameter λ .

$$\begin{aligned}4x + 6z &= 1 \\2x - 2y + 4z &= -1 \\-x + y + \lambda z &= 2\end{aligned}$$

Describe what happens when $\lambda = -2$.

When $\lambda = -1 \cdot 9$ the solution is $x = -22 \cdot 5$, $y = 8 \cdot 25$, $z = 15$.

Find the solution when $\lambda = -2 \cdot 1$.

Comment on these solutions.

(5, 1, 2, 1 marks)

2014

Use Gaussian elimination on the system of equations below to give an expression for z in terms of λ .

$$\begin{aligned}x + y + z &= 2 \\4x + 3y - \lambda z &= 4 \\5x + 6y + 8z &= 11\end{aligned}$$

For what values of λ does this system have a solution?

Determine the solution to this system of equations when $\lambda = 2$.

(6 marks)