Values

[12] 1. (a) Find an equation of the plane Π parallel to the lines l_1 and l_2 and passing through the point P.

$P(1,2,3)$

$$l_1: \begin{aligned} x &= 2t-3 \\ y &= t+1 \\ z &= -t+2 \end{aligned} \qquad l_2: \begin{aligned} x &= t+y \\ y &= -t-1 \\ z &= 2t+1 \end{aligned}$$

(b) Find the distance between the plane Π and the line l_1.

Values

[12] 2. Find all values of k such that the system

$$\begin{array}{rcrcrcl} x & - & y & + & 2z & = & 0 \\ & & y & - & z & = & k \\ -x & + & 2y & - & 3z & = & 1 \end{array}$$

has no solution. Is there any value of k for which there are infinitely many solutions?

[12] 3. Solve by Gauss-Jordan elimination

$$\begin{array}{rcrcrcrcl} x_1 & + & x_2 & - & x_3 & + & x_4 & = & 2 \\ -2x_1 & - & x_2 & + & x_3 & & & = & -4 \\ x_1 & + & x_2 & - & x_3 & + & 2x_4 & = & -1 \end{array}$$

Values

[12] 4. Suppose that A is an invertible $n \times n$ matrix such that $2A^2 = I$, where I is the identity $n \times n$ matrix. Show that $A = \frac{1}{2}A^{-1}$.

[12] 5. (a) Find the inverse of the matrix $A = \begin{bmatrix} 1 & 0 & 1 \\ 1 & 1 & 0 \\ 1 & 1 & 1 \end{bmatrix}$.

(b) **Use** A^{-1} to solve $A \cdot \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$.