Q10 Solve the following system of equations:

$$p - 3q = -3$$
$$p + q = 5$$

Use augment matrix

$$\begin{bmatrix} 1 & -3 & | & -3 \\ 1 & 1 & | & 5 \end{bmatrix}$$

Use Gaussian Elimination, subtract row 1 from row 2

$$\begin{bmatrix} 1 & -3 & | & -3 \\ 0 & 4 & | & 8 \end{bmatrix}$$

Divide row 2 by 4

$$\begin{bmatrix} 1 & -3 & | & -3 \\ 0 & 1 & | & 2 \end{bmatrix}$$

Add 3 times row 2 to row 1

$$\begin{bmatrix} 1 & 0 & | & 3 \\ 0 & 1 & | & 2 \end{bmatrix}$$

Now, we have Identity matrix on the left side, and the solution on the right side.
So, the solution is:

$$p = 3$$
$$q = 2$$