1. Find the value of x, if
$\begin{pmatrix} 3x+y & -y \\ 2y-x & 3 \end{pmatrix} = \begin{pmatrix} 1 & 2 \\ -5 & 3 \end{pmatrix}$.

2. Write the value of the following determinant:
$$\begin{vmatrix} a-b & b-c & c-a \\ b-c & c-a & a-b \\ c-a & a-b & b-c \end{vmatrix}$$

3. Find the value of x from the following:
$$\begin{vmatrix} x & 4 \\ 2 & 2x \end{vmatrix} = 0$$

4. Using properties of determinants, prove the following:
$$\begin{vmatrix} 1 & 1+p & 1+p+q \\ 2 & 3+2p & 1+3p+2q \\ 3 & 6+3p & 1+6p+3q \end{vmatrix} = 1$$

5. Using matrices, solve the following system of equations:
$x+y+z=6$
$x+2z=7$
$3x+y+z=12$

6. Obtain the inverse of the following matrix using elementary opertions:
$$A = \begin{pmatrix} 3 & 0 & -1 \\ 2 & 3 & 0 \\ 0 & 4 & 1 \end{pmatrix}$$