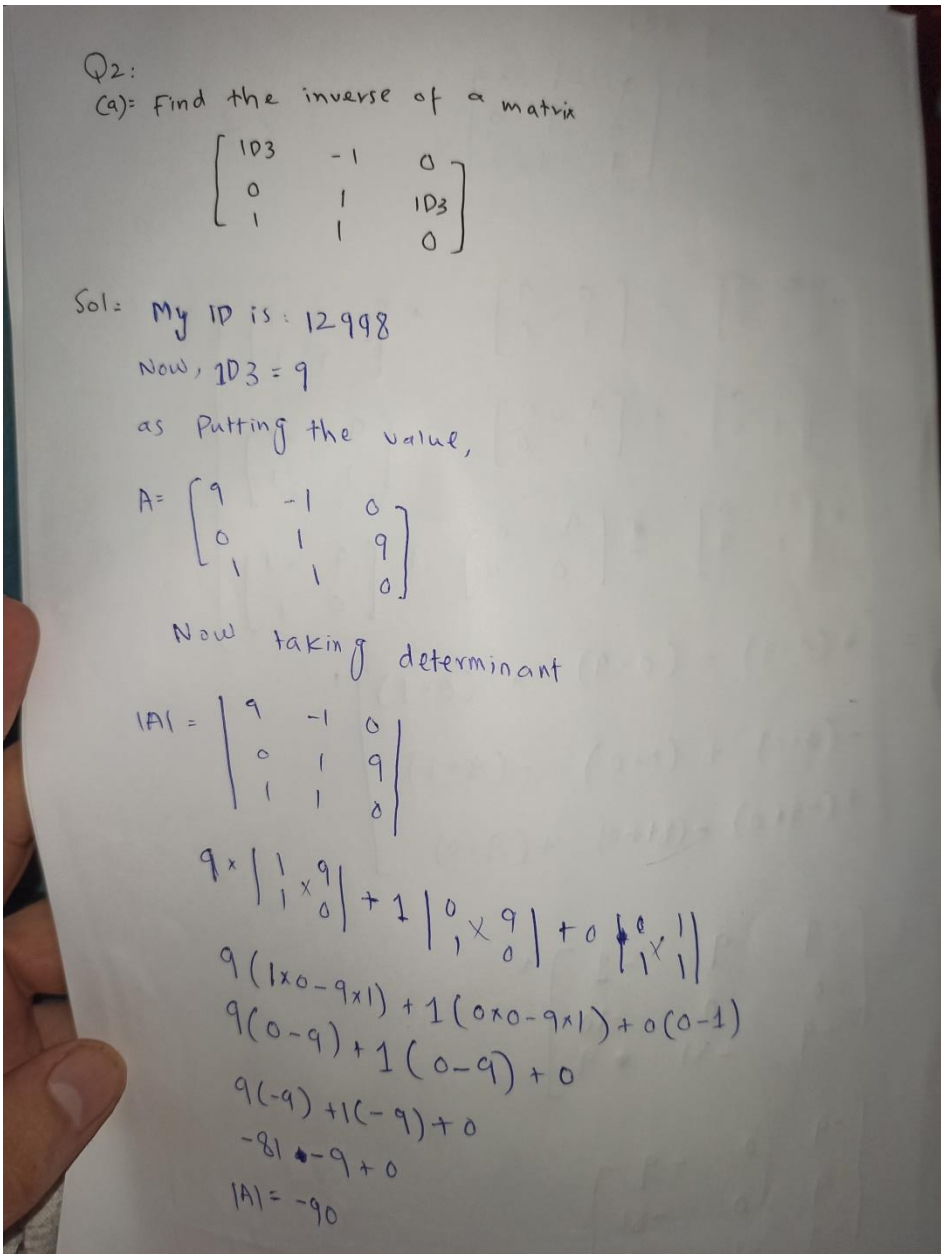
Name: Inzamam
ID# 12998
Course: Linear Algebra
Program: BS(SE

Question No.2 (a)Sol:



Q2:

(a): Find the inverse of a matrix

$$\begin{bmatrix} ID3 & -1 & 0 \\ 0 & 1 & ID3 \\ 1 & 1 & 0 \end{bmatrix}$$

Sol: My ID is: 12998

Now, ID3 = 9

as Putting the value,

$$A = \begin{bmatrix} 9 & -1 & 0 \\ 0 & 1 & 9 \\ 1 & 1 & 0 \end{bmatrix}$$

Now taking determinant

$$|A| = \begin{vmatrix} 9 & -1 & 0 \\ 0 & 1 & 9 \\ 1 & 1 & 0 \end{vmatrix}$$

$$9 \times \begin{vmatrix} 1 & 9 \\ 1 & 0 \end{vmatrix} + 1 \begin{vmatrix} 0 & 9 \\ 1 & 0 \end{vmatrix} + 0 \begin{vmatrix} 0 & 1 \\ 1 & 1 \end{vmatrix}$$

$$9(1 \times 0 - 9 \times 1) + 1(0 \times 0 - 9 \times 1) + 0(0 - 1)$$

$$9(0 - 9) + 1(0 - 9) + 0$$

$$9(-9) + 1(-9) + 0$$

$$-81 - 9 + 0$$

$$|A| = -90$$

Continue..

Now taking adj.

$$\text{Adj}(A) = \text{Adj}\begin{bmatrix} 9 & -1 & 0 \\ 0 & 1 & 9 \\ 1 & 1 & 0 \end{bmatrix}$$

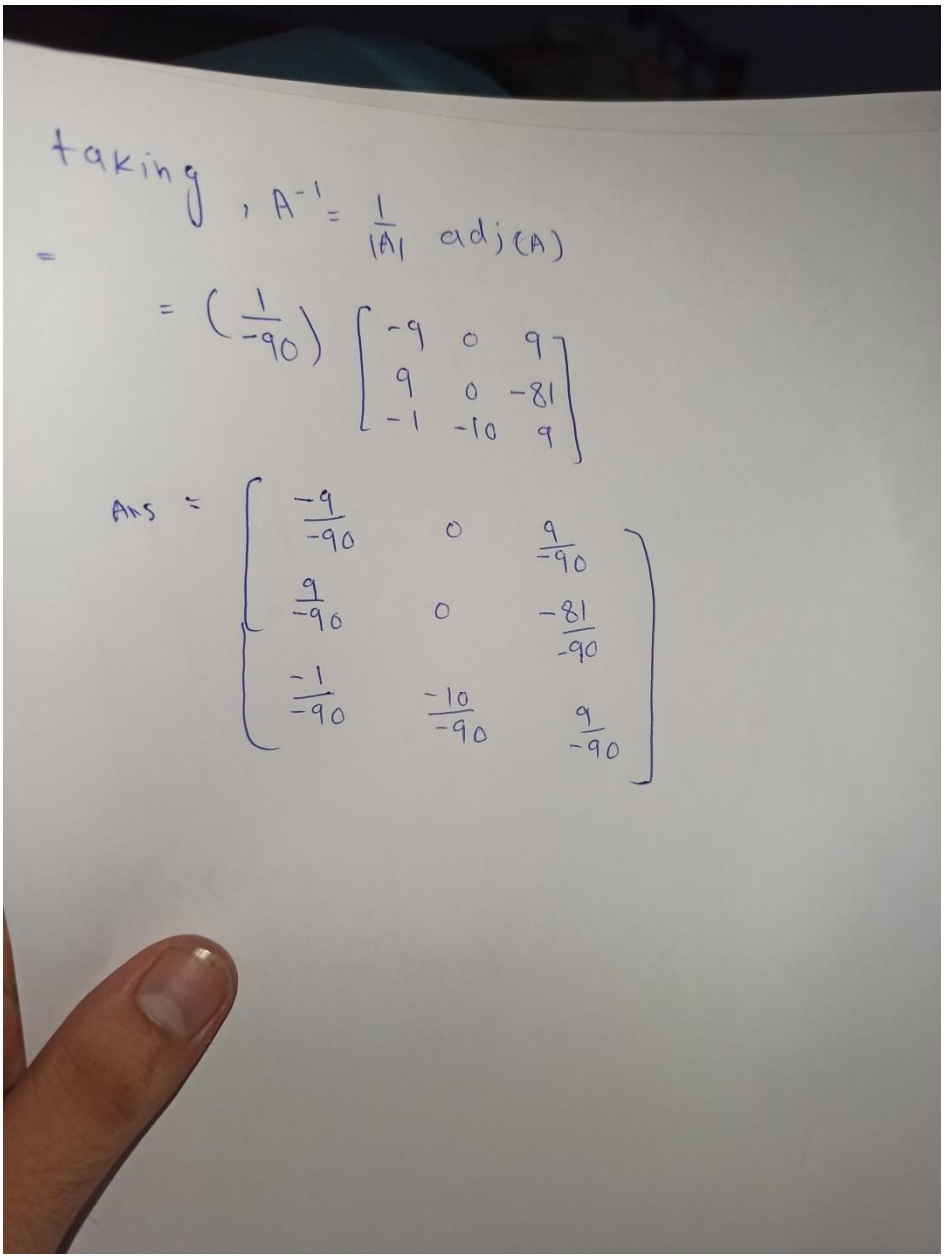
$$= \begin{pmatrix} +\begin{bmatrix} 1 & 9 \\ 1 & 0 \end{bmatrix} & -\begin{bmatrix} 0 & 9 \\ 1 & 0 \end{bmatrix} & +\begin{bmatrix} 0 & 1 \\ 1 & 1 \end{bmatrix} \\ -\begin{bmatrix} -1 & 0 \\ 1 & 0 \end{bmatrix} & +\begin{bmatrix} 9 & 0 \\ 1 & 0 \end{bmatrix} & -\begin{bmatrix} 9 & -1 \\ 1 & 1 \end{bmatrix} \\ +\begin{bmatrix} -1 & 0 \\ 1 & 9 \end{bmatrix} & -\begin{bmatrix} 9 & 0 \\ 0 & 9 \end{bmatrix} & +\begin{bmatrix} 9 & -1 \\ 0 & 1 \end{bmatrix} \end{pmatrix}$$

$$= \begin{bmatrix} +(0-9) & -(0-9) & +(0-1) \\ -(0+0) & +(0+0) & -(9+1) \\ +(-9+0) & -(81+0) & +(9+0) \end{bmatrix}^t$$

$$= \begin{bmatrix} -9 & 9 & -1 \\ 0 & 0 & -10 \\ -9 & -81 & 9 \end{bmatrix}^t$$

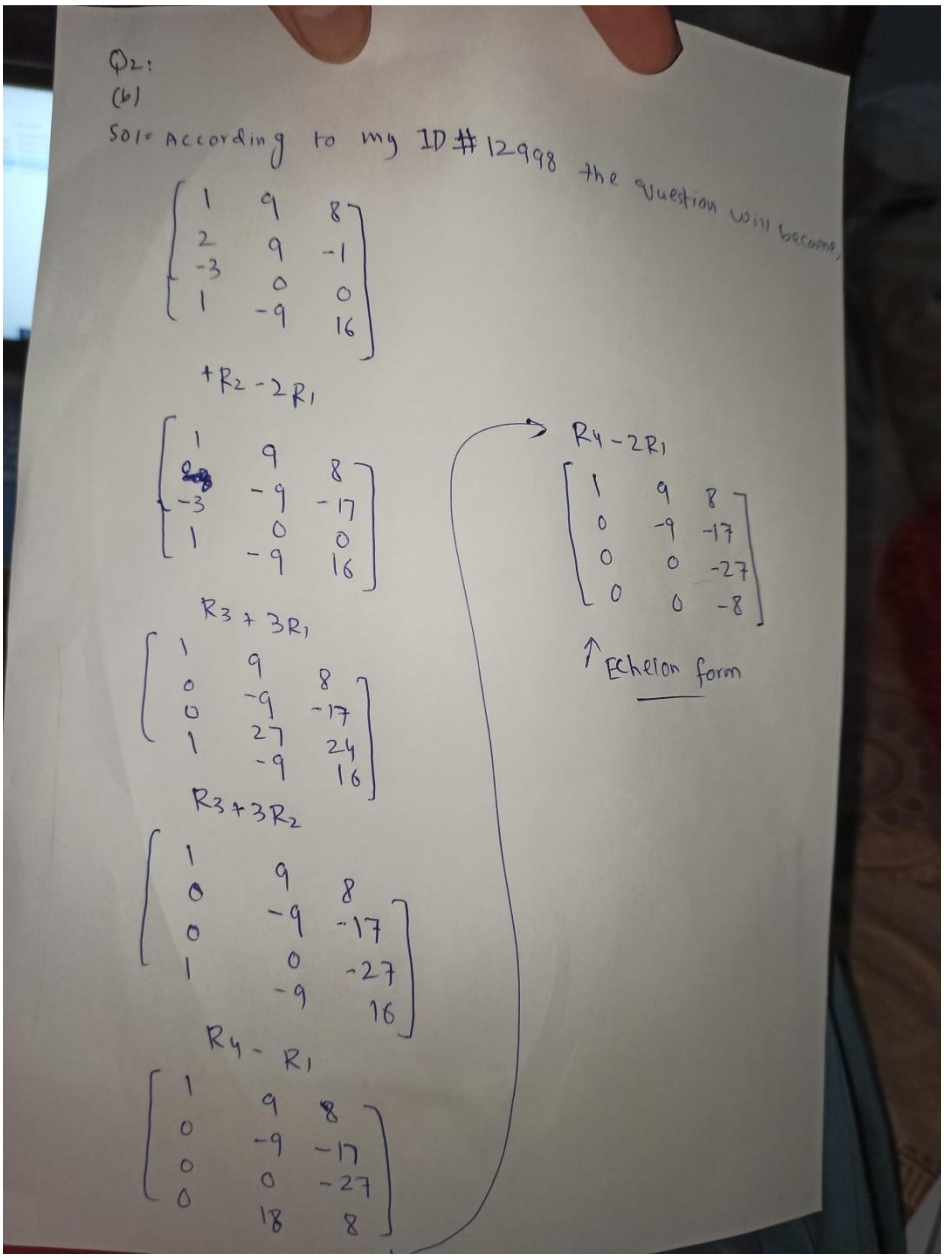
$$= \begin{bmatrix} -9 & 0 & -9 \\ 9 & 0 & -81 \\ -1 & -10 & 9 \end{bmatrix}$$

Continue..

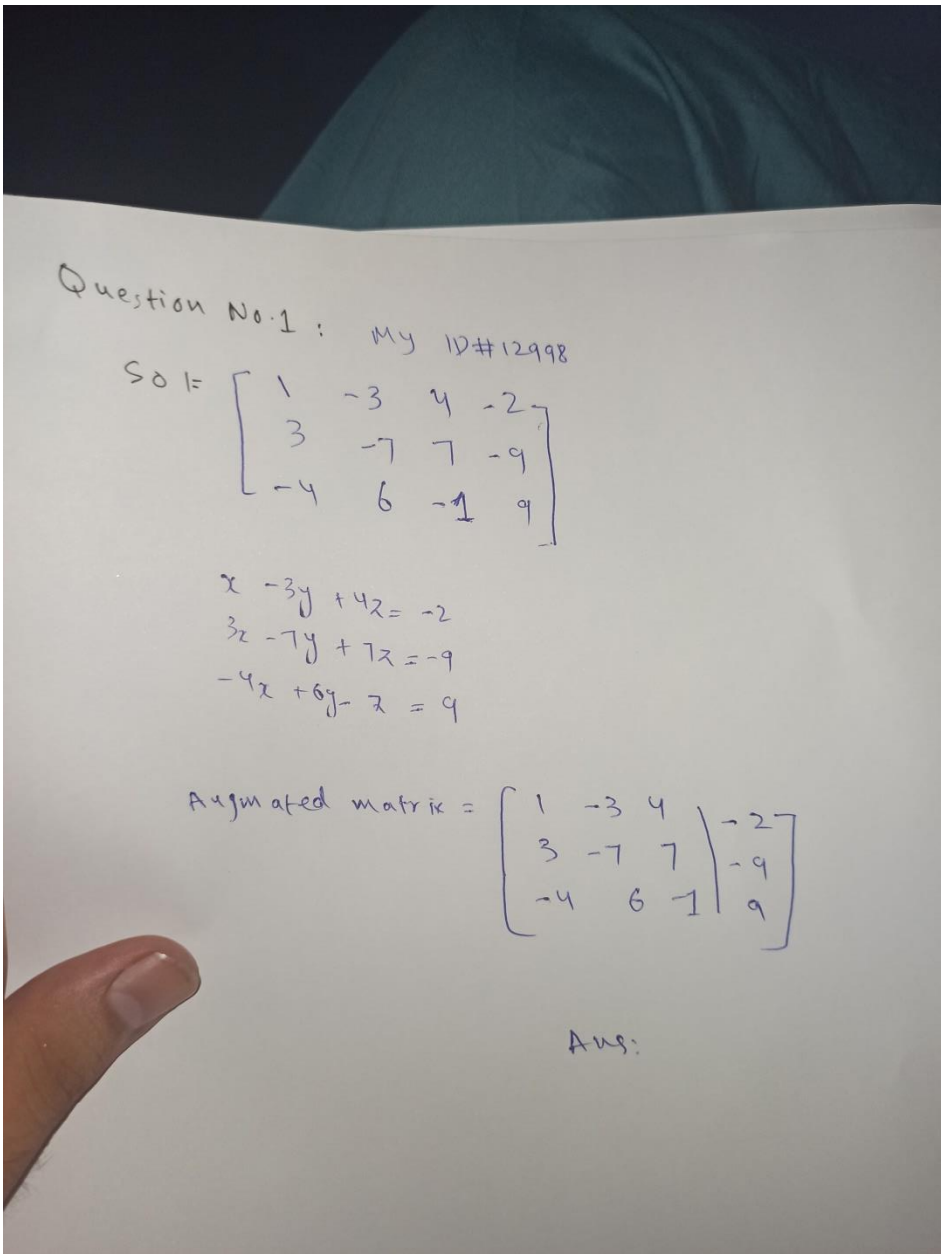

taking , $A^{-1} = \frac{1}{|A|}\,adj(A)$
$= \left(\frac{1}{-90}\right)\begin{bmatrix} -9 & 0 & 9 \\ 9 & 0 & -81 \\ -1 & -10 & 9 \end{bmatrix}$
Ans $= \begin{bmatrix} \frac{-9}{-90} & 0 & \frac{9}{-90} \\ \frac{9}{-90} & 0 & \frac{-81}{-90} \\ \frac{-1}{-90} & \frac{-10}{-90} & \frac{9}{-90} \end{bmatrix}$

(b):

Sol:


Q2:
(b)
Sol: According to my ID # 12998 the question will become,
$\begin{bmatrix} 1 & 9 & 8 \\ 2 & 9 & -1 \\ -3 & 0 & 0 \\ 1 & -9 & 16 \end{bmatrix}$
$+R_2 - 2R_1$
$\begin{bmatrix} 1 & 9 & 8 \\ 0 & -9 & -17 \\ -3 & 0 & 0 \\ 1 & -9 & 16 \end{bmatrix}$
$R_3 + 3R_1$
$\begin{bmatrix} 1 & 9 & 8 \\ 0 & -9 & -17 \\ 0 & 27 & 24 \\ 1 & -9 & 16 \end{bmatrix}$
$R_3 + 3R_2$
$\begin{bmatrix} 1 & 9 & 8 \\ 0 & -9 & -17 \\ 0 & 0 & -27 \\ 1 & -9 & 16 \end{bmatrix}$
$R_4 - R_1$
$\begin{bmatrix} 1 & 9 & 8 \\ 0 & -9 & -17 \\ 0 & 0 & -27 \\ 0 & 18 & 8 \end{bmatrix}$
$R_4 - 2R_1$
$\begin{bmatrix} 1 & 9 & 8 \\ 0 & -9 & -17 \\ 0 & 0 & -27 \\ 0 & 0 & -8 \end{bmatrix}$
↑ Echelon form

Question 1 sol:



Question No. 1 : My ID#12998

Sol:

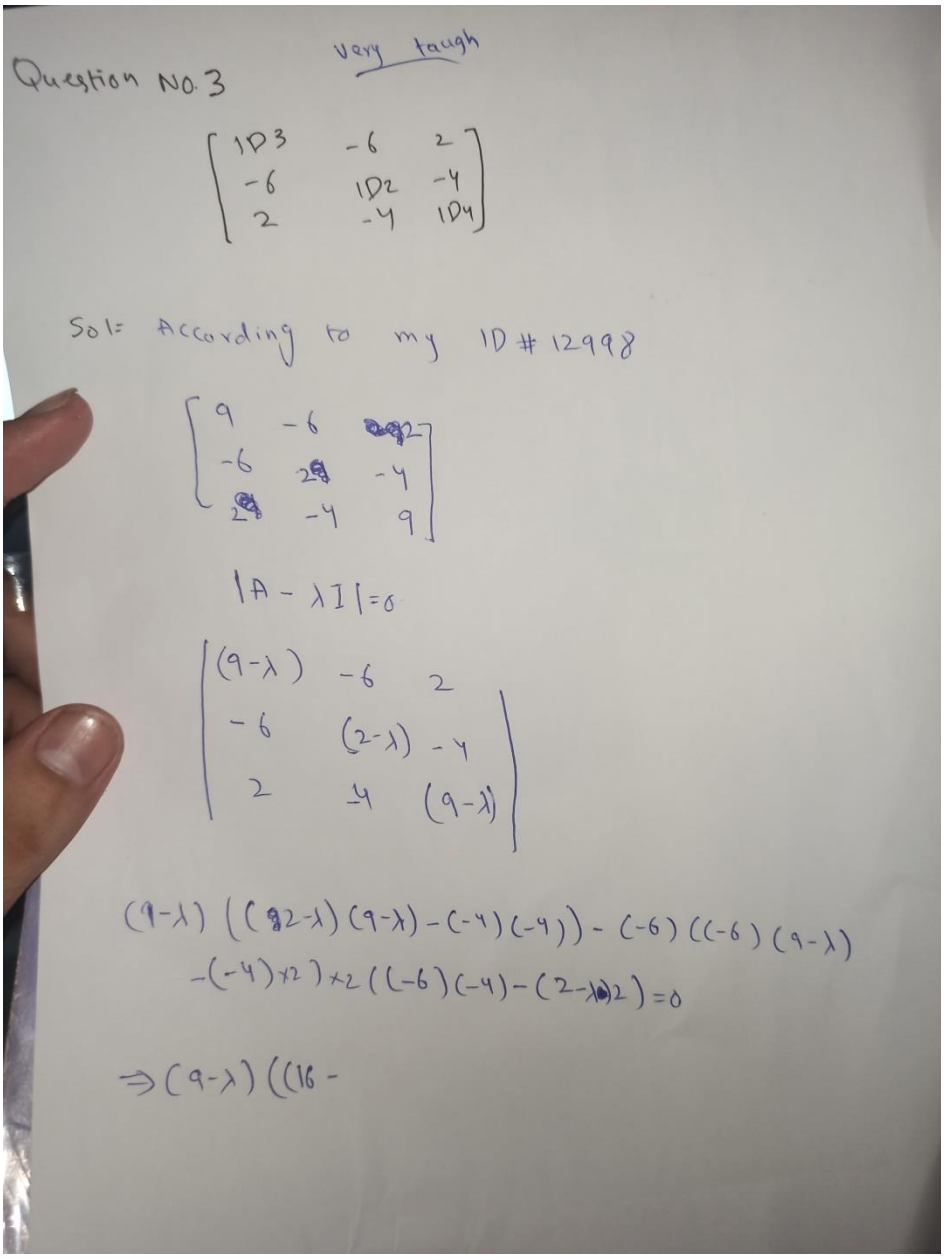
$$\begin{bmatrix} 1 & -3 & 4 & -2 \\ 3 & -7 & 7 & -9 \\ -4 & 6 & -1 & 9 \end{bmatrix}$$

$$x - 3y + 4z = -2$$
$$3x - 7y + 7z = -9$$
$$-4x + 6y - z = 9$$

Augmated matrix = $\left[\begin{array}{ccc|c} 1 & -3 & 4 & -2 \\ 3 & -7 & 7 & -9 \\ -4 & 6 & -1 & 9 \end{array}\right]$

Ans:

Question 3:


Question No 3
very tough
$\begin{bmatrix} 1D3 & -6 & 2 \\ -6 & 1D2 & -4 \\ 2 & -4 & 1D4 \end{bmatrix}$
Sol: According to my ID # 12998
$\begin{bmatrix} 9 & -6 & 2 \\ -6 & 2 & -4 \\ 2 & -4 & 9 \end{bmatrix}$
$|A - \lambda I| = 0$
$\begin{vmatrix} (9-\lambda) & -6 & 2 \\ -6 & (2-\lambda) & -4 \\ 2 & -4 & (9-\lambda) \end{vmatrix}$
$(9-\lambda)\left((2-\lambda)(9-\lambda)-(-4)(-4)\right)-(-6)((-6)(9-\lambda)$
$-(-4)\times 2)+2((-6)(-4)-(2-\lambda)2)=0$
$\Rightarrow (9-\lambda)((16-$