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Assignment - Linear Algebra  
Department - BS (SE)

Question No 1:

Ans:

$$ID = 5$$

$$\begin{bmatrix} 1 & 2 & 5 \\ 2 & 3 & 1 \\ 3 & 1 & 2 \end{bmatrix}$$

$$|A| = 1(5-1) - 2(4-3) + 5(2-9)$$

$$|A| = (4) - 2 - 35$$

$$|A| = 4 - 37$$

$$|A| = -33$$

Now cofactor

$$\begin{bmatrix} 1 & 2 & 5 \\ 2 & 3 & 1 \\ 3 & 1 & 2 \end{bmatrix}$$

$$a_{11} = (-1)^{1+1} |5-1| \Rightarrow (-1)^2 (5) = 5$$

$$a_{12} = (-1)^{1+2} |4-3| \Rightarrow (-1)^3 (1) = -1$$

$$a_{13} = (-1)^{1+3} |2-9| \Rightarrow (-1)^4 (-7) = -7$$

$$a_{21} = (-1)^{2+1} |4-6| = (-1)^3 (-2) = 2$$

$$a_{22} = (-1)^{2+2} |2-18| = (-1)^4 (-16) = -16$$

$$a_{23} = (-1)^{2+3} |1-6| = (-1)^5 (-5) = 5$$

$$a_{31} = (-1)^{3+1} |2-18| = (-1)^4 (-16) = -16$$

$$a_{32} = (-1)^{3+2} |1-15| = (-1)^5 (-14) = 14$$

(2)

$$a_{33} = (-1)^{3+3} (3-4) \Rightarrow (-1)^6 (-1) = -1$$

Here

$$A = \begin{pmatrix} 5 & -1 & -7 \\ 2 & -16 & 5 \\ -16 & 11 & -1 \end{pmatrix}$$

$$\text{Adj}(A) = \begin{pmatrix} 5 & 2 & -16 \\ -1 & -16 & 11 \\ -7 & 5 & -1 \end{pmatrix} \quad \text{Proved.}$$

Q. NO 1

part B:

$$B = \begin{pmatrix} 3 & 4 & 5 \\ 2 & -1 & 8 \\ 5 & -2 & 8 \end{pmatrix}$$

$$|B| = 3(-8+16) - 4(16-40) + 5(-4+5)$$

$$|B| = 3(8) - 4(24) + 5(1)$$

$$|B| = 24 - 96 + 5$$

$$|B| = 24 - 99$$

$$|B| = -67$$

Now the cofactors:

$$\begin{pmatrix} 3 & 4 & 5 \\ 2 & -1 & 8 \\ 5 & -2 & 8 \end{pmatrix}$$

$$a_{11} = (-1)^{1+1} (-8+16) \Rightarrow (-1)^2 (8) = 8$$

$$a_{12} = (-1)^{1+2} (16-40) \Rightarrow (-1)^3 (-24) = 24$$

$$a_{13} = (-1)^{1+3} (4+5) = (-1)^4 (9) = 9$$

$$a_{21} = (-1)^{2+1} (32+10) = (-1)^3 (42) = -42$$

3

$$a_{22} = (-1)^{2+2} (24 - 25) = (-1)^4 (-1) = 1$$

$$a_{23} = (-1)^{2+3} (-6 - 20) = (-1)^5 (-26) = 26$$

$$a_{31} = (-1)^{3+1} (32 + 5) = (-1)^4 (37) = 37$$

$$a_{32} = (-1)^{3+2} (24 - 16) = (-1)^5 (8) = -8$$

$$a_{33} = (-1)^{3+3} (-3 - 8) = (-1)^6 (-11) = -11$$

$$B = \begin{pmatrix} 8 & 24 & 9 \\ -42 & 1 & 26 \\ 37 & -14 & -11 \end{pmatrix}$$

$$\text{Adj}(B) = \begin{pmatrix} 8 & -42 & 37 \\ 24 & 1 & -14 \\ 9 & 26 & -11 \end{pmatrix}$$

Ans 2 :  
Ans,

$$A = \begin{pmatrix} 1 & -2 & 3 \\ -2 & 3 & 1 \\ 4 & -3 & 2 \end{pmatrix}$$

$$|A| = 1(6+3) + 2(-4-4) - 3(6-12)$$

$$|A| = 1(9) + 2(-8) + 3(-6)$$

$$|A| = 9 - 16 - 18$$

$$|A| = 9 - 34$$

$$|A| = -25$$

Now the cofactors of  $A_{21}, A_{31}, A_{33}$

$$a_{21} = (-1)^{2+1} (-4 + 9) = (-1)^3 (5) = -5$$

$$a_{31} = (-1)^{3+1} (-2 - 9) = (-1)^4 (-11) = -11$$

$$a_{33} = (-1)^{3+3} (3 + 4) = (-1)^6 (7) = 7$$