

Name : **SOLUTION**

Student ID :

Question 1 (2 marks : 1 for each value)Find the values of a

$$|A| = \begin{vmatrix} a-1 & 4 \\ 1 & a+2 \end{vmatrix} = 0$$

$$(a-1)(a+2) - 4 = 0$$

$$a^2 - a + 2a - 2 - 4 = 0$$

$$a^2 + a - 6 = 0$$

$$(a+3)(a-2) = 0$$

$$a = -3, 2$$

Question 2 (3 marks)

1) you're given :

$$\bullet A = \begin{bmatrix} 2 & 0 & 2 \\ 0 & 4 & 0 \\ 0 & 0 & 2 \end{bmatrix}$$

a) What is the value of $\det(A)$.Since A is an upper triangular

$$\det(A) = (2)(4)(2) = 16$$

b) find $\text{adj}(A)$.

Matrix of cofactors :

$$\begin{bmatrix} + & \begin{vmatrix} 4 & 0 \\ 0 & 2 \end{vmatrix} & - & \begin{vmatrix} 0 & 0 \\ 0 & 2 \end{vmatrix} & + & \begin{vmatrix} 0 & 4 \\ 0 & 0 \end{vmatrix} \\ - & \begin{vmatrix} 0 & 2 \\ 0 & 2 \end{vmatrix} & + & \begin{vmatrix} 2 & 2 \\ 0 & 2 \end{vmatrix} & - & \begin{vmatrix} 2 & 0 \\ 0 & 0 \end{vmatrix} \\ + & \begin{vmatrix} 0 & 2 \\ 4 & 0 \end{vmatrix} & - & \begin{vmatrix} 2 & 2 \\ 0 & 0 \end{vmatrix} & + & \begin{vmatrix} 2 & 0 \\ 0 & 4 \end{vmatrix} \end{bmatrix} = \begin{bmatrix} +8 & 0 & 0 \\ 0 & +4 & 0 \\ +(0-8) & 0 & +8 \end{bmatrix}$$

$$\text{adj}(A) = \begin{bmatrix} +8 & 0 & 0 \\ 0 & +4 & 0 \\ -8 & 0 & +8 \end{bmatrix}^T = \begin{bmatrix} +8 & 0 & -8 \\ 0 & +4 & 0 \\ 0 & 0 & +8 \end{bmatrix}$$

b) find A^{-1} .

$$A^{-1} = \frac{1}{\det(A)} \text{adj}(A)$$

$$A^{-1} = \frac{1}{16} \begin{bmatrix} +8 & 0 & -8 \\ 0 & +4 & 0 \\ 0 & 0 & +8 \end{bmatrix}$$

Bonus:

Determine if the following statement is true or false (NO Verification Required).

- Inverses can be found only for squared matrices. True