$-48 + 120$

72

11

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③ a) $(\lambda - 1)(\lambda + 1) - 0 = 0$

$\lambda = 1$ ou -1

b)
$$\begin{vmatrix} \lambda-4 & 4 & 0 \\ -1 & \lambda & 0 \\ 0 & 0 & \lambda-5 \end{vmatrix} \begin{matrix} \lambda-4 & 4 \\ -1 & \lambda \\ 0 & 0 \end{matrix}$$

$(\lambda-4)(\lambda-5)(\lambda) + 0 + 0 - (0 + 0 + 4\lambda + 20)$

$\lambda(\lambda^2 - 5\lambda - 4\lambda + 20) + 4\lambda + 20$

$\lambda^3 - 9\lambda^2 + 20\lambda + 4\lambda + 20 = 0$

~~$\lambda^3 - 9\lambda^2 + 24\lambda + 20 = 0$~~

$\lambda^3 - 9\lambda^2 + 24\lambda + 20 = 0$

$\lambda = 2$ ou $\lambda = 5$

④

a) $3 \cdot 1 \cdot (4-45) + 0 + 0 = -123$

b) $3 \cdot (-41) + 2 \cdot (-1) \cdot 0 + 1 \cdot 1 \cdot 0 = -123$

c) $\underbrace{2 \cdot (-1) \cdot 0}_{0} + \underbrace{(-1) \cdot 1 \cdot 12}_{-12} + \underbrace{5 \cdot (-1) \cdot 27}_{-135} = -123$

d) $0 + \underbrace{(-1) \cdot 1 \cdot (-12)}_{12} + \underbrace{9 \cdot (-1) \cdot 15}_{-135} = -123$

e) $1 \cdot 1 \cdot 0 + \underbrace{9 \cdot (-1) \cdot 15}_{-135} + \underbrace{(-4) \cdot (1) \cdot (-3)}_{12} = -123$

f) $0 + \underbrace{5 \cdot (-1) \cdot 27}_{-135} + \underbrace{(-4) \cdot (1) (-3)}_{12} = -123$

(7)

a)

$$A = \begin{bmatrix} 0 & 3 & -1 & 2 \\ -1 & -1 & 2 & 1 \\ 3 & 2 & 4 & 1 \end{bmatrix}$$

$L_3 - 2L_2$

$L_3 \leftrightarrow L_4$

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

$L_2 - L_1$

$L_3 - 3L_4$

$$\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & -1 & 2 & 1 \\ 0 & 0 & 5 & -1 \end{bmatrix}$$

$$\det A = -\det B$$

$$= -(4)(5)(-3) = -123$$

b)

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

$L_4 + \frac{1}{2}L_1$

$L_3 - 2L_4$

$$\begin{bmatrix} 2 & -1 & 3 & 1 \\ 0 & 0 & -1 & 2 \\ 0 & 2 & -1 & 0 \\ 0 & \frac{3}{2} & \frac{11}{2} & -\frac{1}{2} \end{bmatrix}$$

$L_4 + \frac{3}{2}L_2$

$$\begin{bmatrix} 2 & -1 & 3 & 1 \\ 0 & 0 & -1 & 2 \\ 0 & 2 & -1 & 0 \\ 0 & 0 & -3 & 6 \end{bmatrix}$$

$L_4 + 3L_3$

$$\begin{bmatrix} 2 & -1 & 3 & 1 \\ 0 & 0 & -1 & 2 \\ 0 & 2 & -1 & 0 \\ 0 & 0 & 0 & 6 \end{bmatrix}$$

$$\det = 24$$

(11) a)

$$\left[\begin{array}{ccc|cc} 2 & 5 & 5 & 2 & 5 \\ -1 & -1 & 0 & -1 & -1 \\ 2 & 4 & 3 & 2 & 4 \end{array}\right]$$

$-6 + 0 - 20 - (-10 + 0 - 15)$

$-26 + 25 = 1$

~~possui determinante~~, é invertível

b)

$$\left[\begin{array}{ccc|cc} 4 & 2 & 8 & 4 & 2 \\ -2 & 1 & -4 & -2 & 1 \\ 3 & 1 & 6 & 3 & 1 \end{array}\right]$$

$24 + (-24) - 16 - (24 - 16 - 24)$

$-16 + 16$

~~Não possui~~ Não é ~~determinante~~ é invertível

c)

$$\begin{bmatrix} 2 & 0 & 0 \\ 8 & 1 & 0 \\ -5 & 3 & 6 \end{bmatrix}$$

$12 - 0 = 12$

~~$= -12$~~

~~possui determinante~~ é invertível

(12)

a)

$$\begin{bmatrix} 2 & 5 & 5 \\ -1 & -1 & 0 \\ 2 & 4 & 3 \end{bmatrix}$$

Det $= 4$

é invertível

b)

$$A = \begin{bmatrix} 2 & -3 & 5 \\ 0 & 1 & -3 \\ 0 & 0 & 2 \end{bmatrix}$$

$\det = 4$

$\tilde{a}_{11} = 1 \cdot 2 = 2$

$\tilde{a}_{12} = 0$

$\tilde{a}_{13} = 0$

$\tilde{a}_{21} = -1 \cdot (-6) = 6$

$\tilde{a}_{22} = 1 \cdot 4 = 4$

$\tilde{a}_{23} = 0$

$\tilde{a}_{31} = 1 \cdot 4 = 4$

$\tilde{a}_{32} = -1 \cdot (-6) = +6$

$\tilde{a}_{33} = 1 \cdot 2 = 2$

$$\bar{A} = \begin{bmatrix} 2 & 0 & 0 \\ 6 & 4 & 0 \\ 4 & 6 & 2 \end{bmatrix}^t$$

$$\bar{A}^t = \begin{bmatrix} 2 & 6 & 4 \\ 0 & 4 & 6 \\ 0 & 0 & 2 \end{bmatrix}$$

$$A^{-1} = \frac{1}{4} \begin{bmatrix} 2 & 6 & 4 \\ 0 & 4 & 6 \\ 0 & 0 & 2 \end{bmatrix} = \begin{bmatrix} 1/2 & 3/2 & 1 \\ 0 & 1 & 3/2 \\ 0 & 0 & 1/2 \end{bmatrix}$$

(13) b)

$$\left[\begin{array}{ccc|cc} 1 & -3 & 1 & 1 & -3 \\ 2 & -1 & 0 & 2 & -1 \\ 4 & 0 & -3 & 4 & 0 \end{array}\right]$$

$3 + 0 + 0 - (-4 + 0 + 18)$

-11

c)

$$\left[\begin{array}{ccc|cc} 3 & -1 & 1 & 3 & -1 \\ -1 & 7 & -2 & -1 & 7 \\ 2 & 6 & -1 & 2 & 6 \end{array}\right]$$

$det = -21 + 4 - 6 - (14 - 36 - 1)$

$det = -23 - (-23)$

$det = 0$

(14)

a) $\det(A) \cdot \det(3) = -21$

b) $\det(A^{-1}) = \frac{1}{\det A} = -\frac{1}{7}$

(13) Sapendo,

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

$A^t = \begin{bmatrix} 1 & 4 \\ 3 & 2 \end{bmatrix}$

$\det \begin{bmatrix} 1 & 4 \\ 3 & 2 \end{bmatrix} \cdot \begin{bmatrix} 1 & 3 \\ 4 & 2 \end{bmatrix} \Rightarrow \det \begin{bmatrix} 17 & 11 \\ 11 & 13 \end{bmatrix}$

$\det = (17 \cdot 13) - (121)$

$221 - 121$

100

$\det \begin{bmatrix} 1 & 3 \\ 4 & 2 \end{bmatrix} \cdot \begin{bmatrix} 1 & 4 \\ 3 & 2 \end{bmatrix} \Rightarrow \det \begin{bmatrix} 10 & 10 \\ 10 & 20 \end{bmatrix}$

$\det = 200 - 100$

$\det = 100$