1) la place

a) $\begin{vmatrix} 1 & 2 \\ -4 & 3 \end{vmatrix}$

$\det A = a_{11} \cdot \tilde{a}_{11} + a_{12} \cdot \tilde{a}_{12}$

$= 1 \cdot (-1)^{1+1} \det(\tilde{A}_{11}) + 2 \cdot (-1)^{1+2} \det(\tilde{A}_{12})$

$= 1 \cdot (3) + (-2) \cdot (-4) \Rightarrow 11$

b) $\begin{vmatrix} \sqrt{2} & 3\sqrt{6} \\ 2 & \sqrt{3} \end{vmatrix}$

$\det A = a_{21} \cdot \tilde{a}_{21} + a_{22} \cdot \tilde{a}_{21}$

$= 2 \cdot (-1)^{2+1} \det(A_{21}) + \sqrt{3} \cdot (-1)^{2+2} \det(\tilde{A}_{22})$

$= -2 \cdot 3\sqrt{6} + \sqrt{3} \cdot \sqrt{2} \Rightarrow -6\sqrt{6} + \sqrt{6}$

c) $\begin{vmatrix} \pi & 0 & 2 \\ 5 & -1 & 1 \\ 1 & 0 & 0 \end{vmatrix}$

$\det A = a_{31} \cdot \tilde{a}_{31} + a_{32} \cdot \tilde{a}_{32} + a_{32} \cdot \tilde{a}_{32} + a_{33} \cdot \tilde{a}_{33}$

$= 1 \cdot (-1)^{3+1} \cdot \det(A_{31}) + 0 \cdot (-1)^{3+2} \cdot (\tilde{A}_{32}) + 0 \cdot (-1)^{3+3} \cdot (\tilde{A}_{33})$

$= \begin{vmatrix} 0 & 2 \\ -1 & 1 \end{vmatrix} = a_{11} \cdot \tilde{a}_{11} \det(\tilde{A}_{11}) + a_{12} \cdot \tilde{a}_{12} \det(\tilde{A}_{12})$

$= 0 \cdot (-1)^{1+1} \det(\tilde{A}_{11}) + 2 \cdot (-1)^{1+2} \det(\tilde{A}_{12})$

$= 2 \cdot (-1) = -2$

d) $\begin{vmatrix} -2 & 1 & -1 \\ 1 & 5 & 4 \\ 3 & 4 & 2 \end{vmatrix}$

$\det A = a_{11} \cdot \tilde{a}_{11} \det(\tilde{A}_{11}) + a_{12} \cdot \tilde{a}_{12} \det(\tilde{A}_{12}) + a_{13} \cdot \tilde{a}_{13} \det(\tilde{A}_{12})$

$= -2 \cdot (-1)^{1+1} \cdot \begin{vmatrix} 5 & 4 \\ 4 & 2 \end{vmatrix} + 1 \cdot (-1)^{1+2} \begin{vmatrix} 1 & 4 \\ 3 & 2 \end{vmatrix} + -1 \cdot (-1)^{1+3} \begin{vmatrix} 1 & 5 \\ 3 & 4 \end{vmatrix}$

$= \begin{vmatrix} -10 & -8 \\ -8 & -4 \end{vmatrix} + \begin{vmatrix} -1 & -4 \\ -3 & -2 \end{vmatrix} + \begin{vmatrix} -1 & -5 \\ -3 & -4 \end{vmatrix}$

$= \begin{vmatrix} -12 & -17 \\ -14 & -10 \end{vmatrix} = -14 \cdot (-1)^{2+1} \det(\tilde{A}_{21}) + (-10) \cdot (-1)^{2+2} \det(\tilde{A}_{22})$

$= 14 \cdot (-17) + (-10) \cdot (-12)$

$= 238 + 120 = 358$

FORONI

e) $\begin{vmatrix} 0 & 2 & 0 \\ 1 & 3 & 5 \\ 2 & -1 & 2 \end{vmatrix}$

$\det A = 0 \cdot \tilde{a}_{11}(\tilde{A}_{11}) + 2 \cdot \tilde{a}_{12}(\tilde{A}_{12}) + 0 \cdot \tilde{a}_{13}(\tilde{A}_{13})$

$= 2 \cdot (-1)^{1+2} \begin{vmatrix} 1 & 5 \\ 2 & 2 \end{vmatrix}$

$= -2 \begin{vmatrix} 1 & 5 \\ 2 & 2 \end{vmatrix} \Rightarrow \begin{vmatrix} -2 & -10 \\ -4 & -4 \end{vmatrix} = -4 \cdot (-1)^{2+1} \det(A_{21}) + (-4) \cdot (-1)^{2+2} \det(A_{22})$

$= 4 \cdot (-10) + (-4) \cdot (-2)$

$-40 + 8 = -32$

f) $\begin{vmatrix} 3 & -1 & 1 & 1 \\ 0 & 1 & 0 & 1 \\ 0 & -1 & 1 & 0 \\ 0 & 0 & 1 & -1 \end{vmatrix}$

$\det A = 3 \cdot (-1)^{1+1} \cdot (\tilde{A}_{11})$

$= 3 \cdot \begin{vmatrix} 1 & 0 & 1 \\ -1 & 1 & 0 \\ 0 & 1 & -1 \end{vmatrix}$

$= \begin{vmatrix} 3 & 0 & 3 \\ -3 & 3 & 0 \\ 0 & 3 & -3 \end{vmatrix}$

$\det A = 0 \cdot (-1)^{1+2} \cdot (\tilde{A}_{12}) + 3 \cdot (-1)^{2+2} \cdot (\tilde{A}_{22}) + 3 \cdot (-1)^{3+2} \cdot (\tilde{A}_{32})$

$= 3 \begin{vmatrix} 3 & 3 \\ 0 & -3 \end{vmatrix} + (-3) \cdot \begin{vmatrix} 3 & 3 \\ -3 & 0 \end{vmatrix}$

$= \begin{vmatrix} 9 & 9 \\ 0 & -9 \end{vmatrix} + \begin{vmatrix} -9 & -9 \\ 9 & 0 \end{vmatrix}$

$= \begin{vmatrix} 0 & 0 \\ 0 & -9 \end{vmatrix} \xrightarrow{D_3} \det A = 0$

g) $\begin{vmatrix} 1 & 0 & 0 & 0 & 0 \\ 5 & 1 & 2 & 5 & 3 \\ 7 & 2 & \sqrt{5} & 0 & 0 \\ 10 & -3 & 6 & 1 & 0 \\ -2 & -3 & 0 & 0 & 0 \end{vmatrix}$

$\det A = 1 \cdot (-1)^{1+1} \cdot (\tilde{A}_{11})$

$= \begin{vmatrix} 1 & 2 & 5 & 3 \\ 2 & \sqrt{5} & 0 & 0 \\ -3 & 6 & 1 & 0 \\ -3 & 0 & 0 & 0 \end{vmatrix}$

$\det A = 3 \cdot (-1)^{1+4} + (\tilde{A}_{14})$

$= -3 \begin{vmatrix} 2 & \sqrt{5} & 0 \\ -3 & 6 & 1 \\ -3 & 0 & 0 \end{vmatrix}$

$= \begin{vmatrix} -6 & -3\sqrt{5} & 0 \\ 9 & -18 & -3 \\ 9 & 0 & 0 \end{vmatrix}$

$\det A = -3 \cdot (-1)^{2+3} \cdot (\tilde{A}_{23})$

$= 3 \begin{vmatrix} -6 & -3\sqrt{5} \\ 9 & 0 \end{vmatrix}$

$= \begin{vmatrix} -18 & -9\sqrt{5} \\ 27 & 0 \end{vmatrix} = \det A = 27 \cdot (-1)^{2+1} \cdot (A_{21})$

$= -27 \cdot (-9\sqrt{5}) \Rightarrow 243\sqrt{5}$

h) $\begin{vmatrix} 3 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -2 \\ 0 & 0 & 2 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & -2 & 0 & 0 & 0 \end{vmatrix} \Rightarrow \det A = 3 \cdot (-1)^{1+1} \cdot (\tilde{A}_{11})$

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

na outra folha!

$$\det A = \begin{vmatrix} 0 & 0 & 0 & -6 \\ 0 & 6 & 0 & 0 \\ 0 & 0 & 3 & 0 \\ -6 & 0 & 0 & 0 \end{vmatrix}$$

$$\det A = 3 \cdot (-1)^{3+3} \cdot (\bar{A}_{33})$$

$$= 3 \begin{vmatrix} 0 & 0 & -6 \\ 0 & 6 & 0 \\ -6 & 0 & 0 \end{vmatrix}$$

$$= \begin{vmatrix} 0 & 0 & -18 \\ 0 & 18 & 0 \\ -18 & 0 & 0 \end{vmatrix}$$

$$\det A = 18 \cdot (-1)^{2+2} \cdot (\bar{A}_{22})$$

$$= 18 \begin{vmatrix} 0 & -18 \\ -18 & 0 \end{vmatrix}$$

$$= \begin{vmatrix} 0 & -324 \\ -324 & 0 \end{vmatrix} \Rightarrow \det A = -324 \cdot (-1)^{2+1} \cdot (\tilde{A}_{21})$$

$$= 324 \cdot (-324) \Rightarrow 104{,}976$$

2) $A = \begin{pmatrix} 3 & -5 & 7 \\ 4 & 2 & 8 \\ 1 & 9 & 6 \end{pmatrix}$; $B = \begin{pmatrix} 4 & 3 & 7 \\ -1 & 0 & 2 \\ 3 & 1 & -4 \end{pmatrix}$; $C = \begin{pmatrix} 2 & 3 & -1 \\ 6 & 9 & -2 \\ 8 & 12 & -3 \end{pmatrix}$

a) $\det(A+B)$

$$\det \left| \begin{matrix} 7 & -2 & 14 \\ 3 & 2 & 10 \\ 4 & 10 & 2 \end{matrix} \right| \begin{matrix} 7 & -2 \\ 3 & 2 \\ 4 & 10 \end{matrix}$$

$$\det = 28 - 80 + 420 - 112 - 700 + 12$$

$$= -432$$

b) $\det(AB)$

$$\det \left| \begin{matrix} 12 & -15 & 49 \\ -4 & 0 & 10 \\ 3 & 9 & -24 \end{matrix} \right| \begin{matrix} 12 & -15 \\ -4 & 0 \\ 3 & 9 \end{matrix}$$

$$\det = 0 - 450 - 1764 - 0 - 1080 + 1440$$

 $\det = -1854$

c) $\det(B^t A^t)$

$$\det\begin{pmatrix} 4 & -1 & 3 \\ 3 & 0 & 1 \\ 7 & 2 & -4 \end{pmatrix} \cdot \begin{pmatrix} 3 & 4 & 1 \\ -5 & 2 & -9 \\ 7 & 8 & 6 \end{pmatrix}$$

$$\det\left|\begin{array}{ccc|cc} 12 & -4 & 3 & 12 & -4 \\ -15 & 0 & -9 & -15 & 0 \\ 49 & 16 & -24 & 49 & 16 \end{array}\right.$$

$\det = 0 - 1728 - 1440 - 0 - 1764 + 720$

$\det = -4212$ //

d) $\det(3A - 2C + B)$

$$\begin{pmatrix} 9 & -15 & 21 \\ 12 & 6 & 24 \\ 3 & -27 & 18 \end{pmatrix} - \begin{pmatrix} 4 & 6 & -2 \\ 12 & 18 & -4 \\ 16 & 24 & -6 \end{pmatrix} + \begin{pmatrix} 4 & 3 & 7 \\ -1 & 0 & 2 \\ 3 & 1 & -4 \end{pmatrix}$$

$$\det\left|\begin{array}{ccc|cc} 9 & -18 & 30 & 9 & -18 \\ -1 & -12 & 30 & -1 & -12 \\ -10 & 0 & 20 & -10 & 0 \end{array}\right.$$

$\det = -2160 + 5400 - 0 - 52 - 0 - 360$

$\det = 2828$ //

e) $\det(AC^t)$

$$\begin{pmatrix} 3 & -5 & 7 \\ 4 & 2 & 8 \\ 1 & -9 & 6 \end{pmatrix} \begin{pmatrix} 2 & 6 & 8 \\ 3 & 9 & 12 \\ -1 & -2 & -3 \end{pmatrix}$$

$$\det\left|\begin{array}{ccc|cc} 6 & -30 & 56 & 6 & -30 \\ 12 & 18 & 96 & 12 & 18 \\ -1 & 18 & -18 & -1 & 18 \end{array}\right.$$

$\det = -1944 + 2880 + 12096 + 1008 + 10368 + 6480$

$\det = 30888$ //

3) $\det(A) = -2$; $A_{4\times4}$

a) $\det(A^t)$

$\det(A^t) = \det(A) = -2$

b) $\det(6A)$

$\cdot \det(cA) = c^n \cdot \det(A)$

$\therefore \det(6A) = 6^4 \cdot (-2) \Rightarrow -2592$

c) $\det(A^7)$

$\cdot \det(A^7) = (-2)^7 = -128$

d) $\det(A^{-1})$

$\cdot \det(A^{-1}) = 1/\det(A) \Rightarrow -1/2$

4) $\begin{vmatrix} a & b & c \\ d & e & f \\ g & h & i \end{vmatrix} = -3$

a) $\begin{vmatrix} a & b & c \\ d & e & f \\ 4g & 4h & 4i \end{vmatrix} = -3 \cdot 4 \Rightarrow -12$

$l_1 = 4 \cdot l_1$

b) $\begin{vmatrix} a & b & -2c \\ 3d & 3e & -6f \\ g & h & -2i \end{vmatrix} = -3 \cdot 3 \cdot (-2) = 18$

$l_2 = 3 l_2$ $\qquad c_3 = -2c_3$

c) $\begin{vmatrix} -a & -b & -c \\ g & h & i \\ -d & -e & -f \end{vmatrix} \rightarrow l_1 = -1 l_1$

$= 3 \cdot (-1) \Rightarrow -3$

d) 1ª $\begin{vmatrix} g & h & i \\ a & b & c \\ d & e & f \end{vmatrix}$ 1ª Troca

2ª Troca $\Rightarrow det(A) = -3$

e) $\begin{vmatrix} a & b & c \\ 2d+a & 2e+b & 2f+c \\ g & h & i \end{vmatrix}$

$\begin{vmatrix} a & b & c \\ 2d & 2e & 2f \\ g & h & i \end{vmatrix} \Rightarrow 2 \begin{vmatrix} a & b & c \\ d & e & f \\ g & h & i \end{vmatrix} \Rightarrow det(A) = 2 \cdot (-3) = -6$

f) $\begin{vmatrix} ka+a & kb+b & kc+c \\ d & e & f \\ g & h & i \end{vmatrix}$

$\begin{vmatrix} a(k+1) & b(k+1) & c(k+1) \\ d & e & f \\ g & h & i \end{vmatrix}$

$(k+1) \begin{vmatrix} a & b & c \\ d & e & f \\ g & h & i \end{vmatrix} \Rightarrow det(A) = -3(k+1) = -3k+3$

tilibra

5)

$$\det(A) = \begin{vmatrix} 10 & 8 & 40 & -2 \\ 4 & 6 & 20 & -4 \\ -5 & -7 & -30 & 1 \\ 3 & -6 & -30 & 12 \end{vmatrix} \begin{matrix} \to 2 \\ \to 2 \\ \\ \to 3 \end{matrix}$$

$$\det(A) = 12 \cdot \begin{vmatrix} 5 & 4 & 20 & -1 \\ 2 & 3 & 10 & -2 \\ -5 & -7 & -30 & 1 \\ 1 & -2 & -10 & 4 \end{vmatrix}$$

$$= 120 \begin{vmatrix} 5 & 4 & 2 & -1 \\ 2 & 3 & 1 & -2 \\ -5 & -7 & -3 & 1 \\ 1 & -2 & -1 & 4 \end{vmatrix}$$

$$= -1 \begin{vmatrix} 4 & 2 & -1 \\ 3 & 1 & -2 \\ -7 & 3 & 1 \end{vmatrix} + (-2) \begin{vmatrix} 5 & 2 & -1 \\ 2 & 1 & -2 \\ -5 & 3 & 1 \end{vmatrix} + \begin{vmatrix} 5 & 4 & -1 \\ 2 & 3 & -2 \\ -5 & -7 & 1 \end{vmatrix}$$

$$+ 4 \begin{vmatrix} 5 & 4 & 2 \\ 2 & 3 & 1 \\ -5 & -7 & 3 \end{vmatrix}$$

$$= \begin{vmatrix} -4 & -2 & 1 \\ -3 & -1 & 2 \\ 7 & -3 & -1 \end{vmatrix} + \begin{vmatrix} -10 & -4 & 2 \\ -4 & -2 & 4 \\ 10 & -6 & -2 \end{vmatrix} + \begin{vmatrix} 5 & 4 & -1 \\ 2 & 3 & -2 \\ -5 & -7 & 1 \end{vmatrix} + \begin{vmatrix} 20 & 16 & 8 \\ 8 & 12 & 4 \\ -20 & -28 & 12 \end{vmatrix}$$

$$= 120 \cdot \left|\begin{array}{ccc|cc} 11 & -18 & 10 & 11 & -18 \\ 3 & 12 & 8 & 3 & 12 \\ -8 & -44 & 10 & -8 & -44 \end{array}\right.$$

$$\det(A) = 120 \cdot (1320 + 1152 - 1320 + 960 - 3872 + 540)$$

$$= 120 \cdot (-1220) \Rightarrow -146400$$

6)

a) $\begin{vmatrix} 4 & \overset{2}{6} & x \\ 7 & 4 & 2x \\ 5 & 2 & -x \end{vmatrix} = -128$

$2\begin{vmatrix} 4 & 3 & x \\ 7 & 2 & 2x \\ 5 & 1 & -x \end{vmatrix}\begin{matrix} 4 & 3 \\ 7 & 2 \\ 5 & 1 \end{matrix} = 128$

$2 \cdot (-6x + 30x + 7x - 10x - 8x + 21x) = 128$

$68x = -128 \Rightarrow x \cong -1,89$ //

b) $\begin{vmatrix} 3 & 5 & 7 \\ 2x & x & 3x \\ 4 & 6 & 7 \end{vmatrix}\begin{matrix} 3 & 5 \\ 2x & x \\ 4 & 6 \end{matrix} = 39$

$21x + 60x + 84x - 28x - 54x - 70x = 39$

$13x = 39 \Rightarrow x = 3$ //

c) $\begin{vmatrix} x+3 & x+1 & x+4 \\ 4 & 5 & 3 \\ 9 & 10 & 7 \end{vmatrix} = -7$

$(x+3)\begin{vmatrix} 5 & 3 \\ 10 & 7 \end{vmatrix} - (x+1)\begin{vmatrix} 4 & 3 \\ 9 & 7 \end{vmatrix} + (x+4)\begin{vmatrix} 4 & 5 \\ 9 & 10 \end{vmatrix}$

$(x+3) \cdot \quad - (x+1) + (x+4) \cdot (-5) = -7$

$\cancel{5x} + 15 - x - 1 - \cancel{5x} - 20 = -7$

$-x = -1 \Rightarrow x = 1$ //

6) singular ∴ det = 0

d) $\begin{vmatrix} x & x+2 \\ 1 & x \end{vmatrix} = 0 \Rightarrow \begin{vmatrix} 2 & 2+2 \\ 1 & 2 \end{vmatrix} = 0$

$x^2 - x - 2 = 0$ $\quad\quad 4 - 4 = 0$

$(-x-2)(-x+0)$ $\quad\quad 0 = 0$

$\boxed{x = 2}$ $\quad x = 0$ $\quad\quad \therefore x = 2$

$2^2 - 2 - 2 = 0$

$0 = 0$

e) $\begin{pmatrix} x-4 & 0 & 3 \\ 2 & 0 & x-9 \\ 0 & 3 & 0 \end{pmatrix} \neq 0$ é invertível

$3 \begin{vmatrix} x-4 & 0 & 3 \\ 2 & 0 & x-9 \\ 0 & 1 & 0 \end{vmatrix} \neq 0$

$-3 \begin{vmatrix} x-4 & 3 \\ 2 & x-9 \end{vmatrix} \neq 0$

$-3(x^2 - 13x + 36 - 6) \neq 0$

$-3x^2 + 39x - 90 \neq 0 \quad : 3$

$-x^2 + 13x - 30 \neq 0 \quad \cdot (-1)$

$x^2 - 13x + 30 \neq 0$

$(x-3)(x-10) = 0$

$x = 3 \quad x = 10$

enquanto x não tiver esses valores, a matriz continuará invertível

7) $A = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$

a) matriz da inversa é
$$\begin{pmatrix} d & -b \\ -c & a \end{pmatrix}$$

$\det(A^{-1}) = (ad - bc) \therefore (1/(ad-bc))$

· cond. existência: $ad - bc \neq 0$

b) $A = \begin{pmatrix} 3 & 1 \\ 5 & 2 \end{pmatrix}$; $B = \begin{pmatrix} 4 & 7 \\ 1 & 2 \end{pmatrix}$

· A^{-1}

$\det(A^{-1}) = \dfrac{1}{1} = 1$

· B^{-1}

$\det(B^{-1}) = \dfrac{1}{1} = 1$

· $(AB)^{-1} = B^{-1}A^{-1}$

$\therefore 1 \cdot 1 \Rightarrow \det(B^{-1}A^{-1}) = 1$

8) matriz cofatores

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

$\mathrm{cof}(A) = \begin{pmatrix} (-1)^{1+1} \cdot 2 & (-1)^{1+2} \cdot (-2) \\ (-1)^{2+1} \cdot 3 & (-1)^{2+2} \cdot 1 \end{pmatrix} \Rightarrow \begin{pmatrix} 2 & 2 \\ -3 & 1 \end{pmatrix}$

b) $B = \begin{pmatrix} 2 & -2 & 0 \\ 1 & 2 & 1 \\ 0 & 1 & -1 \end{pmatrix}$

$\mathrm{cof}(B) = -1 \begin{vmatrix} 2 & 0 \\ 1 & 1 \end{vmatrix} + (-1) \begin{vmatrix} 2 & -2 \\ 1 & 2 \end{vmatrix}$

$\mathrm{cof}(B) = \begin{vmatrix} -2 & 0 \\ -1 & -1 \end{vmatrix} + \begin{vmatrix} -2 & 2 \\ -1 & -2 \end{vmatrix}$

$\mathrm{cof}(B) = \begin{vmatrix} 0 & 2 \\ 0 & -3 \end{vmatrix} \Rightarrow 0$

FORONI

9) matriz adjunta p/ encontrar inversa

a) $A = \begin{vmatrix} 2 & -2 \\ 3 & 1 \end{vmatrix}$

$cof(A) = \begin{vmatrix} (-1)^{1+1} \cdot 2 & (-1)^{1+2} \cdot (-2) \\ (-1)^{2+1} \cdot 3 & (-1)^{2+2} \cdot 1 \end{vmatrix} = \begin{vmatrix} 2 & 2 \\ -3 & 1 \end{vmatrix}$

$adj(A) = [cof(A)]^t \Rightarrow \begin{vmatrix} 2 & -3 \\ 2 & 1 \end{vmatrix}$

b) $B = \begin{vmatrix} 2 & -2 & 0 \\ 1 & 2 & 1 \\ 0 & 1 & 1 \end{vmatrix}$

$B = -1 \begin{vmatrix} 2 & 0 \\ 1 & 1 \end{vmatrix} + 1 \begin{vmatrix} 2 & -2 \\ 1 & 2 \end{vmatrix}$

$= \begin{vmatrix} -2 & 0 \\ -1 & -1 \end{vmatrix} + \begin{vmatrix} 2 & -2 \\ 1 & 2 \end{vmatrix}$

$= \begin{vmatrix} 0 & -2 \\ 0 & 1 \end{vmatrix}$

$cof(B) = \begin{vmatrix} 0 & 2 \\ 0 & 1 \end{vmatrix}$

$adj(B) = [cof(B)]^t \Rightarrow \begin{vmatrix} 0 & 0 \\ 2 & 1 \end{vmatrix}$

c) $C = \begin{vmatrix} 0 & -1 & 1 \\ 2 & 0 & -1 \\ 1 & 1 & 0 \end{vmatrix}$

$C = 1 \cdot \begin{vmatrix} -1 & 1 \\ 0 & -1 \end{vmatrix} + (-1) \begin{vmatrix} 0 & 1 \\ 2 & -1 \end{vmatrix}$

$= \begin{vmatrix} -1 & 1 \\ 0 & -1 \end{vmatrix} + \begin{vmatrix} 0 & -1 \\ -2 & 1 \end{vmatrix}$

$= \begin{vmatrix} -1 & 0 \\ -2 & 0 \end{vmatrix}$

$cof(C) = \begin{vmatrix} -1 & 0 \\ 2 & 0 \end{vmatrix}$

$adj(C) = [cof(C)]^t = \begin{bmatrix} -1 & 2 \\ 0 & 0 \end{bmatrix}$

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d) $D = \begin{vmatrix} 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & 0 \\ 2 & 0 & 2 & 3 \\ 0 & 0 & -1 & 0 \end{vmatrix}$

$D = \begin{vmatrix} 1 & 0 & 1 \\ 2 & 2 & 3 \\ 0 & -1 & 0 \end{vmatrix}$

$= \begin{vmatrix} 2 & 3 \\ -1 & 0 \end{vmatrix} + \begin{vmatrix} 2 & 2 \\ 0 & -1 \end{vmatrix}$

$= \begin{vmatrix} 4 & 5 \\ -1 & -1 \end{vmatrix}$

$cof(D) = \begin{vmatrix} 4 & -5 \\ 1 & -1 \end{vmatrix}$; adj: $[cof(B)]^t \Rightarrow \begin{vmatrix} 4 & 1 \\ -5 & -1 \end{vmatrix}$ //

10) eq. matricial: $2A^t = C - XB$ (quadrada c 3x3)

a) $XB = C - 2A^t$

$\underbrace{(XB)B^{-1}}_{Im} = (C - 2A^t)B^{-1}$

$X = (C - 2A^t)B^{-1}$ imposição $\Rightarrow$ $det(B) \neq 0$

b) $X = \left(\begin{pmatrix} 4 & 4 & 0 \\ 0 & 8 & -2 \\ -2 & 0 & 6 \end{pmatrix} - \begin{pmatrix} 2 & 4 & 0 \\ 0 & 6 & -2 \\ -2 & 0 & 4 \end{pmatrix}\right) \cdot \begin{pmatrix} 3 & -6 & 4 \\ 1 & -3 & 3 \\ -1 & 2 & -1 \end{pmatrix}$

$X = \begin{pmatrix} 2 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 2 \end{pmatrix} \cdot \begin{pmatrix} 3 & -6 & 4 \\ 1 & -3 & 3 \\ -1 & 2 & -1 \end{pmatrix}$

$X = 2IB^{-1} \Rightarrow 2B^{-1}$

$X = \begin{pmatrix} 6 & -12 & 8 \\ 2 & -6 & 6 \\ -2 & 4 & -2 \end{pmatrix}$ //