

4.A PÁGINA 87 (CAPÍTULO 4)

$$\begin{aligned}
 DE &= \begin{bmatrix} 2 & 6 \\ 0 & 3 \end{bmatrix}_{2 \times 2} \times \begin{bmatrix} 1/2 & -1 \\ 0 & 1/3 \end{bmatrix}_{2 \times 2} \\
 &= \begin{bmatrix} 2(1/2) + 6(0) & 2(-1) + 6(1/3) \\ 0(1/2) + 3(0) & 0(-1) + 3(1/3) \end{bmatrix} \\
 &= \begin{bmatrix} 1 + 0 & -2 + 2 \\ 0 + 0 & 0 + 1 \end{bmatrix} \\
 &= \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}_{2 \times 2} \quad \text{LOGO: 'E' É A INVERSA DE 'D'}.
 \end{aligned}$$

4.B PÁGINA 87 (CAPÍTULO 4)

$$\begin{aligned}
 FG &= \begin{bmatrix} 1 & 5 \\ 6 & 8 \end{bmatrix}_{2 \times 2} \times \begin{bmatrix} -1/2 & 1/4 \\ 3/8 & -1/16 \end{bmatrix}_{2 \times 2} \\
 &= \begin{bmatrix} 1(-1/2) + 5(3/8) & 1(1/4) + 5(-1/16) \\ 6(-1/2) + 8(3/8) & 6(1/4) + 8(-1/16) \end{bmatrix} \\
 &= \begin{bmatrix} -1/2 + 3/2 & 1/4 - 5/16 \\ -3 + 3 & 3/2 - 1/2 \end{bmatrix} \\
 &= \begin{bmatrix} 2/2 & 0 \\ 0 & 2/2 \end{bmatrix} \\
 &= \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}_{2 \times 2} \quad \text{LOGO: 'G' É A INVERSA DE 'F'}.
 \end{aligned}$$

1.A PÁGINA 86 (CAPÍTULO 5)

APLICA-SE 5.2

1.B PÁGINA 86 (CAPÍTULO 5) APLICA-SE 5.2

1.C PÁGINA 86 (CAPÍTULO 3)

APLICA-SE 3.3

1.D PÁGINA 86 (CAPÍTULO 3)

APLICA-SE 3.1

1.E PÁGINA 86 (CAPÍTULO 3)

APLICA-SE 3.2

2.A PÁGINA 86 (CAPÍTULO 3)

APLICA-SE $P \Rightarrow Q$

2.B PÁGINA 86 (CAPÍTULO 3)

APLICA-SE $P \Leftarrow Q$

2.C PÁGINA 86 (CAPÍTULO 3)

APLICA-SE $P \Leftrightarrow Q$

3.A PÁGINA 87 (CAPÍTULO 5) SIM

3.B PÁGINA 87 (CAPÍTULO 5) SIM

3.C PÁGINA 87 (CAPÍTULO 5) SIM

3.D) PÁGINA 87 (CAPÍTULO 5) NÃO

4.A) PÁGINA 87 (CAPÍTULO 5) NÃO

4.B) PÁGINA 87 (CAPÍTULO 5) SIM

4.C) PÁGINA 87 (CAPÍTULO 5) SIM

4.D) PÁGINA 87 (CAPÍTULO 5) NÃO

EM ALGUNS CASOS SIM PORÉM EM OUTROS NÃO.

1.A) PÁGINA 91 (CAPÍTULO 5)

$$\begin{aligned}
 |A| &= 1(-1)^{1+1} \begin{vmatrix} 2 & 3 \\ 3 & 6 \end{vmatrix} + 1(-1)^{1+2} \begin{vmatrix} 1 & 3 \\ 1 & 6 \end{vmatrix} + 1(-1)^{1+3} \begin{vmatrix} 1 & 2 \\ 1 & 3 \end{vmatrix} \\
 &= 1(-1)^2 [2(6) - 3(3)] + 1(-1)^3 [1(6) - 3(1)] + 1(-1)^4 [1(3) - 2(1)] \\
 &= 1(1)(12 - 9) + 1(-1)(6 - 3) + 1(1)(3 - 2) \\
 &= 1(3) - 1(3) + 1(1) \\
 &= 3 - 3 + 1 \\
 &= 1
 \end{aligned}$$

1.B) PÁGINA 91 (CAPÍTULO 5)

ESSA MATRIZ É SINGULAR LOGO NÃO HÁ DETERMINANTE.

1.C) PÁGINA 91 (CAPÍTULO 5)

$$\begin{aligned}
 |C| &= 1(-1)^{1+2} \begin{vmatrix} 4 & 1 \\ 6 & 3 \end{vmatrix} \\
 &= -1(-1)(12 - 6) \\
 &= -1(-6) \\
 &= 6
 \end{aligned}$$

1.D) PÁGINA 91 (CAPÍTULO 3)

ESSA MATRIZ É SINGULAR LOGO NÃO HÁ DETERMINANTE.

1.E) PÁGINA 91 (CAPÍTULO 3)

$$\begin{aligned}
 |E| &= a(-1)^{1+1} \begin{vmatrix} c & a \\ a & b \end{vmatrix} + b(-1)^{1+2} \begin{vmatrix} b & a \\ c & b \end{vmatrix} + c(-1)^{1+3} \begin{vmatrix} b & c \\ c & a \end{vmatrix} \\
 &= a(-1)^2 [c(b) - a(a)] + b(-1)^3 [b(b) - a(c)] + c(-1)^4 [b(a) - c(c)] \\
 &= a(1)(cb - a^2) + b(-1)(b^2 - ac) + c(1)(ba - c^2) \\
 &= a(cb - a^2) - b(b^2 - ac) + c(ba - c^2) \\
 &= abc - a^3 - b^3 + abc + abc - c^3 \\
 &= -a^3 - b^3 - c^3 + 3abc
 \end{aligned}$$

2) PÁGINA 92 (CAPÍTULO 3)

$|C_{13}| \geq 0$ SINAL POSITIVO

$|C_{23}| \geq 0$ SINAL NEGATIVO

$|C_{33}| \geq 0$ SINAL POSITIVO

$|C_{51}| \geq 0$ SINAL NEGATIVO

$|C_{35}| \geq 0$ SINAL NEGATIVO

3) PÁGINA 92 (CAPÍTULO 3)

$$\begin{aligned}
 |M_{11}| &= ci - fR & |C_{11}| &= + |M_{11}| \\
 & & &= ci - fR
 \end{aligned}$$

$$|M_{12}| = d_i - fg \quad |C_{12}| = -|M_{12}|$$

$$= -d_i + fg$$

$$|M_{32}| = af - ed \quad |C_{32}| = -|M_{32}|$$

$$= -af + ed$$

4.A PÁGINA 92 (CAPÍTULO 3)

$$|A| = 4(-1)^{2+3} \begin{vmatrix} 1 & 8 & 7 \\ 7 & 6 & -1 \\ 0 & -5 & 8 \end{vmatrix}$$

$$= 4(-1)^5 \left[1(-1)^{1+1} \begin{vmatrix} 6 & -1 \\ -5 & 8 \end{vmatrix} + 1(-1)^{2+1} \begin{vmatrix} 8 & 7 \\ -5 & 8 \end{vmatrix} \right]$$

$$= 4(-1) \left[1(-1)^2 [6(8) - (-1)(-5)] + 1(-1)^3 [8(8) - 7(-5)] \right]$$

$$= -4 [1(1)(48 - 5) + 1(-1)(64 + 35)]$$

$$= -4 [1(43) - 1(99)]$$

$$= -4(43 - 99)$$

$$= -4(-56)$$

$$= 224$$

4.B PÁGINA 92 (CAPÍTULO 3) RESOLVER UTILIZANDO A TERCEIRA LINHA (0 0 9 0).

$$|B| = 4(-1)^{1+1} \begin{vmatrix} 6 & 1 & 8 \\ 0 & 9 & 0 \\ -3 & 1 & 4 \end{vmatrix} + 4(-1)^{1+2} \begin{vmatrix} 3 & 1 & 8 \\ 0 & 9 & 0 \\ 1 & 1 & 4 \end{vmatrix} + 0(-1)^{1+3} \begin{vmatrix} 3 & 6 & 8 \\ 0 & 0 & 0 \\ 1 & -3 & 4 \end{vmatrix} +$$

$$+ 4(-1)^{1+4} \begin{vmatrix} 3 & 6 & 1 \\ 0 & 0 & 9 \\ 1 & -3 & 1 \end{vmatrix}$$

CALCULAR OS DETERMINANTES DAS MATRIZES 3X3:

$$\begin{array}{|c|c|c|} \hline 6 & 1 & 8 \\ \hline 0 & 9 & 0 \\ \hline -3 & 1 & 4 \\ \hline \end{array} = 6(-1)^{1+1} \begin{array}{|c|c|} \hline 9 & 0 \\ \hline 1 & 4 \\ \hline \end{array} + 1(-1)^{1+2} \begin{array}{|c|c|} \hline 0 & 0 \\ \hline -3 & 4 \\ \hline \end{array} + 8(-1)^{1+3} \begin{array}{|c|c|} \hline 0 & 9 \\ \hline -3 & 1 \\ \hline \end{array}$$

$$\begin{aligned}
 &= 6(-1)^2 [9(4) - 0(1)] + 1(-1)^3 [0(4) - 0(-3)] + 8(-1)^4 [0(1) - 9(-3)] \\
 &= 6(1)(36 - 0) + 1(-1)(0 - 0) + 8(1)(0 + 27) \\
 &= 6(36) - 1(0) + 8(27) \\
 &= 216 - 0 + 216 \\
 &= 432
 \end{aligned}$$

$$\begin{array}{|c|c|c|} \hline 5 & 1 & 8 \\ \hline 0 & 9 & 0 \\ \hline 1 & 1 & 4 \\ \hline \end{array} = 5(-1)^{1+1} \begin{array}{|c|c|} \hline 9 & 0 \\ \hline 1 & 4 \\ \hline \end{array} + 1(-1)^{1+2} \begin{array}{|c|c|} \hline 0 & 0 \\ \hline 1 & 4 \\ \hline \end{array} + 8(-1)^{1+3} \begin{array}{|c|c|} \hline 0 & 9 \\ \hline 1 & 1 \\ \hline \end{array}$$

$$\begin{aligned}
 &= 5(-1)^2 [9(4) - 0(1)] + 1(-1)^3 [0(4) - 0(1)] + 8(-1)^4 [0(1) - 9(1)] \\
 &= 5(1)(36 - 0) + 1(-1)(0 - 0) + 8(1)(0 - 9) \\
 &= 5(36) - 1(0) + 8(-9) \\
 &= 180 - 0 - 72 \\
 &= 108
 \end{aligned}$$

$$\begin{array}{|c|c|c|} \hline 5 & 6 & 8 \\ \hline 0 & 0 & 0 \\ \hline 1 & -3 & 4 \\ \hline \end{array} = 5(-1)^{1+1} \begin{array}{|c|c|} \hline 0 & 0 \\ \hline -3 & 4 \\ \hline \end{array} + 6(-1)^{1+2} \begin{array}{|c|c|} \hline 0 & 0 \\ \hline 1 & 4 \\ \hline \end{array} + 8(-1)^{1+3} \begin{array}{|c|c|} \hline 0 & 0 \\ \hline 1 & -3 \\ \hline \end{array}$$

$$\begin{aligned}
 &= 5(-1)^2 [0(4) - 0(-3)] + 6(-1)^3 [0(4) - 0(1)] + 8(-1)^4 [0(-3) - 0(1)] \\
 &= 5(1)(0 - 0) + 6(-1)(0 - 0) + 8(1)(0 - 0) \\
 &= 5(0) - 6(0) + 8(0) \\
 &= 0
 \end{aligned}$$

$$\begin{array}{|c|c|c|} \hline 5 & 6 & 1 \\ \hline 0 & 0 & 9 \\ \hline 1 & -3 & 1 \\ \hline \end{array} = 5(-1)^{1+1} \begin{array}{|c|c|} \hline 0 & 9 \\ \hline -3 & 1 \\ \hline \end{array} + 6(-1)^{1+2} \begin{array}{|c|c|} \hline 0 & 9 \\ \hline 1 & 1 \\ \hline \end{array} + 1(-1)^{1+3} \begin{array}{|c|c|} \hline 0 & 0 \\ \hline 1 & -3 \\ \hline \end{array}$$

$$\begin{aligned}
 &= 5(-1)^2 [0(1) - 9(-3)] + 6(-1)^3 [0(1) - 9(1)] + 1(-1)^4 [0(-3) - 0(1)] \\
 &= 5(1)(0 + 27) + 6(-1)(0 - 9) + 1(1)(0 - 0)
 \end{aligned}$$

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$$\begin{vmatrix} 5 & 6 & 1 \\ 0 & 0 & 9 \\ 1 & -3 & 1 \end{vmatrix} = 5(27) - 6(-9) + 1(0)$$

$$= 135 + 54 + 0$$

$$= 189$$

CONTINUANDO O DETERMINANTE DE B:

$$\begin{aligned} |B| &= 5(-1)^2(932) + 7(-1)^3(108) + 0(-1)^4(0) + 5(-1)^5(189) \\ &= 5(1)(932) + 7(-1)(108) + 0(1)(0) + 5(-1)(189) \\ &= 1.728 - 756 + 0 - 756 \\ &= 216 \end{aligned}$$

$$\begin{aligned} \textcircled{5} |M_{25}| &= \begin{vmatrix} 2 & 3 & 4 \\ 1 & 6 & 0 \\ 0 & -5 & 0 \end{vmatrix} & |C_{25}| &= -|M_{25}| \\ & & &= -(-20) \\ & & &= 20 \\ &= -5(-1)^{3+2} \begin{vmatrix} 2 & 4 \\ 1 & 0 \end{vmatrix} \\ &= -5(-1)^5 [2(0) - 4(1)] \\ &= -5(-1)(0 - 4) \\ &= 5(-4) \\ &= -20 \end{aligned}$$

1) PÁGINA 96 (CAPÍTULO 3)

$$\begin{aligned} |A| &= 1(-1)^{1+1} \begin{vmatrix} 5 & 7 \\ 3 & 9 \end{vmatrix} + (-1)(-1)^{1+3} \begin{vmatrix} 1 & 5 \\ 3 & 3 \end{vmatrix} \\ &= 1(-1)^2 [5(9) - 7(3)] + (-1)(-1)^4 [1(3) - 5(3)] \\ &= 1(1)(45 - 21) + (-1)(1)(3 - 15) \\ &= 1(24) - 1(-12) \end{aligned}$$

$$\begin{aligned} \text{libra } 24 + 12 \\ &= 36 \end{aligned}$$

VERIFICANDO A PROPRIEDADE I:

$$\begin{bmatrix} 1 & 1 & 3 \\ 0 & 5 & 3 \\ -1 & 7 & 9 \end{bmatrix}$$

$$\begin{aligned} |A| &= 1(-1)^{1+1} \begin{vmatrix} 5 & 3 \\ 7 & 9 \end{vmatrix} + 1(-1)^{1+2} \begin{vmatrix} 0 & 3 \\ -1 & 9 \end{vmatrix} + 3(-1)^{1+3} \begin{vmatrix} 0 & 5 \\ -1 & 7 \end{vmatrix} \\ &= 1(-1)^2 [5(9) - 3(7)] + 1(-1)^2 [0(9) - 3(-1)] + 3(-1)^4 [0(7) - 5(-1)] \\ &= 1(1)(45 - 21) + 1(-1)(0 + 3) + 3(1)(0 + 5) \\ &= 1(24) - 1(3) + 3(5) \\ &= 24 - 3 + 15 \\ &= 21 + 15 \\ &= 36 \end{aligned}$$

VERIFICANDO A PROPRIEDADE II:

$$\begin{bmatrix} 1 & 5 & 7 \\ 1 & 0 & -1 \\ 3 & 3 & 9 \end{bmatrix}$$

$$\begin{aligned} |A| &= 1(-1)^{1+1} \begin{vmatrix} 0 & -1 \\ 3 & 9 \end{vmatrix} + 5(-1)^{1+2} \begin{vmatrix} 1 & -1 \\ 3 & 9 \end{vmatrix} + 7(-1)^{1+3} \begin{vmatrix} 1 & 0 \\ 3 & 3 \end{vmatrix} \\ &= 1(-1)^2 [0(9) - (-1)(3)] + 5(-1)^3 [1(9) - (-1)(3)] + 7(-1)^4 [1(3) - 0(3)] \\ &= 1(1)(0 + 3) + 5(-1)(9 + 3) + 7(1)(3 - 0) \\ &= 1(3) - 5(12) + 7(3) \\ &= 3 - 60 + 21 \\ &= -36 \end{aligned}$$

VERIFICANDO LA PROPIEDAD III: $K=2$

$$\begin{bmatrix} 2 & 0 & -2 \\ 1 & 5 & 7 \\ 3 & 3 & 9 \end{bmatrix}$$

$$\begin{aligned} |A| &= 2(-1)^{1+1} \begin{vmatrix} 5 & 7 \\ 3 & 9 \end{vmatrix} + (-2)(-1)^{1+3} \begin{vmatrix} 1 & 5 \\ 3 & 3 \end{vmatrix} \\ &= 2(-1)^2 [5(9) - 7(3)] - 2(-1)^1 [1(3) - 5(3)] \\ &= 2(1)(45 - 21) - 2(1)(3 - 15) \\ &= 2(24) - 2(-12) \\ &= 48 + 24 \\ &= 72 \end{aligned}$$

VERIFICANDO LA PROPIEDAD IV:

$$\begin{bmatrix} 1 & 0 & -1 \\ 1 & 5 & 7 \\ 3+2 & 3+0 & 9-2 \end{bmatrix} = \begin{bmatrix} 1 & 0 & -1 \\ 1 & 5 & 7 \\ 5 & 3 & 7 \end{bmatrix}$$

$$\begin{aligned} |A| &= 1(-1)^{1+1} \begin{vmatrix} 5 & 7 \\ 3 & 7 \end{vmatrix} + (-1)(-1)^{1+3} \begin{vmatrix} 1 & 5 \\ 5 & 3 \end{vmatrix} \\ &= 1(-1)^2 [5(7) - 7(3)] - 1(-1)^1 [1(3) - 5(5)] \\ &= 1(1)(35 - 21) - 1(1)(3 - 25) \\ &= 1(14) - 1(-22) \\ &= 14 + 22 \\ &= 36 \end{aligned}$$

$$A = \begin{bmatrix} 5 & 7 \\ 3 & 9 \end{bmatrix}$$

$$\begin{aligned} |A| &= 5(-1)^{1+1}(9) + 7(-1)^{1+2}(3) \\ &= 5(-1)^2(9) + 7(-1)^3(3) \\ &= 5(1)(9) + 7(-1)(3) \\ &= 55 - 21 \\ &= 24 \end{aligned}$$

$$B = \begin{bmatrix} 2(5) & 2(7) \\ 2(3) & 2(9) \end{bmatrix} = \begin{bmatrix} 10 & 14 \\ 6 & 18 \end{bmatrix}$$

$$\begin{aligned} |B| &= 10(18) - 14(6) \\ &= 180 - 84 \\ &= 96 \end{aligned}$$

$$\begin{aligned} k^n |A| &= 2^2(24) \\ &= 4(24) \\ &= 96 \end{aligned}$$

3.A PÁGINA 96 (CAPÍTULO 5)

PROPRIEDADE IV: A ADIÇÃO (SUBTRAÇÃO) DE UM MÚLTIPLO DE QUALQUER LINHA A (DE) UMA OUTRA LINHA NÃO ALTERA O VALOR DO DETERMINANTE.

$$\begin{aligned} 3(9) &= 27 & 27 - 27 &= 0 \\ 3(18) &= 54 & 56 - 54 &= 2 \end{aligned}$$

3.B PÁGINA 96 (CAPÍTULO 5)

PROPRIEDADE III: A MULTIPLICAÇÃO DE UMA LINHA (OU UMA COLUNA) PELO ESCALAR K FAZ COM QUE O VALOR DO DETERMINANTE SEJA

MULTIPLICADO POR K.

$$9 \div 9 = 1$$

$$27 \div 9 = 3$$

$$\begin{bmatrix} 9 & 27 \\ 5 & 2 \end{bmatrix} = 9 \begin{bmatrix} 1 & 3 \\ 5/9 & 2/9 \end{bmatrix}$$

$$5 \div 2 = 2$$

$$2 \div 2 = 1$$

$$9(2) \begin{bmatrix} 1 & 3 \\ 2 & 1 \end{bmatrix} = 18 \begin{bmatrix} 1 & 3 \\ 2 & 1 \end{bmatrix}$$

4.A PÁGINA 96 (CAPÍTULO 5)

$$\begin{aligned} |A| &= 5(-1)^{1+1} \begin{vmatrix} 8 & 9 \\ 5 & -15 \end{vmatrix} + 7(-1)^{1+2} \begin{vmatrix} 5 & 9 \\ 8 & -15 \end{vmatrix} + 3(-1)^{1+3} \begin{vmatrix} 5 & 8 \\ 8 & 5 \end{vmatrix} \\ &= 5(-1)^2 [8(-15) - 9(5)] + 7(-1)^3 [5(-15) - 9(8)] + 3(-1)^4 [5(5) - 8(8)] \\ &= 5(1)(-120 - 45) + 7(-1)(-75 - 72) + 3(1)(25 - 64) \\ &= 5(-165) - 7(-147) + 3(-39) \\ &= -780 + 921 - 117 \\ &= 0 \Rightarrow \text{MATRIZ SINGULAR} \end{aligned}$$

4.B PÁGINA 96 (CAPÍTULO 5)

$$\begin{aligned} |B| &= 5(-1)^{1+1} \begin{vmatrix} 1 & 3 \\ 5 & 7 \end{vmatrix} + 7(-1)^{1+3} \begin{vmatrix} 19 & 1 \\ 5 & 5 \end{vmatrix} \\ &= 5(-1)^2 [1(7) - 3(5)] + 7(-1)^4 [19(5) - 1(5)] \\ &= 5(1)(7 - 15) + 7(1)(95 - 5) \end{aligned}$$

$$|B| = 4(-3) + 1(71)$$

$$= -20 + 71$$

$$= 51 \quad \text{2, MATRIZ NÃO-SINGULAR}$$

4.C) PÁGINA 96 (CAPÍTULO 3)

$$|C| = 7(-1)^{1+1} \begin{vmatrix} -45 & 2 \\ 9 & 2 \end{vmatrix} + 3(-1)^{1+3} \begin{vmatrix} 8 & -45 \\ 5 & 9 \end{vmatrix}$$

$$= 7(-1)^2 [(-45)(2) - 2(9)] + 3(-1)^4 [8(9) - (-45)(5)]$$

$$= 7(1)(-90 - 18) + 3(1)(72 + 225)$$

$$= 7(-108) + 3(297)$$

$$= -756 + 891$$

$$= 135 \quad \text{2, MATRIZ SINGULAR}$$

5) PÁGINA 96 (CAPÍTULO 3)

6) PÁGINA 96 (CAPÍTULO 3)

$A_{m \times m} \cdot A_{m \times m} = C_{m \times m}$, COMO $m \neq m$ SE m FOR IGUAL A m A CONDIÇÃO DE NÃO-SINGULARIDADE PERMANECE. CONTUDO, SE m FOR MAIOR QUE m NÃO PODEMOS GARANTIR A NÃO-SINGULARIDADE

(7) PÁGINA 96 (CAPÍTULO 5) A NOVA MATRIZ, POIS O POSTO $\text{rk}(A) = m$.

$A_{m \times m} \cdot A'_{m \times m} = B_{m \times m}$, COMO O POSTO $\text{rk}(A) = m$ DEMONSTRAMOS QUE A MATRIZ RESULTANTE DO PRODUTO $A \cdot A'$ É NECESSARIAMENTE NÃO-SINGULAR

(1) PÁGINA 100 (CAPÍTULO 5)

(2.A) PÁGINA 100 (CAPÍTULO 5)

$$|A| = 3(1) - 8(0)$$

$$= 3 - 0$$

$$= 3 \Rightarrow \text{MATRIZ NÃO-SINGULAR}$$

$$|C_{11}| = 1(-1)^{1+1} = 1(-1)^2 = 1(1) = 1$$

$$|C_{12}| = 0(-1)^{1+2} = 0(-1)^3 = 0(-1) = 0$$

$$|C_{21}| = 8(-1)^{2+1} = 8(-1)^3 = 8(-1) = -8$$

$$|C_{22}| = 3(-1)^{2+2} = 3(-1)^4 = 3(1) = 3$$

$$C = \begin{bmatrix} 1 & 0 \\ -8 & 3 \end{bmatrix}$$

$$\text{adj } A = \begin{bmatrix} 1 & -8 \\ 0 & 3 \end{bmatrix}$$

$$A^{-1} = \frac{1}{|A|} \text{adj } A$$

$$= \frac{1}{3} \begin{bmatrix} 1 & -8 \\ 0 & 3 \end{bmatrix}$$

$$= \begin{bmatrix} 1/3 & -8/3 \\ 0 & 1 \end{bmatrix}$$

2.8 PÁGINA 100 (CAPÍTULO 5)

$$|B| = 1(2) - 0(0)$$

$$= 2 - 0$$

$$= 2$$

$$|C_{11}| = 2(-1)^{1+1} = 2(-1)^2 = 2(1) = 2$$

$$|C_{12}| = 0(-1)^{1+2} = 0(-1)^3 = 0(-1) = 0$$

$$|C_{21}| = 0(-1)^{2+1} = 0(-1)^3 = 0(-1) = 0$$

$$|C_{22}| = 1(-1)^{2+2} = 1(-1)^4 = 1(1) = 1$$

$$C = \begin{bmatrix} 2 & 0 \\ 0 & 1 \end{bmatrix}$$

$$B^{-1} = \frac{1}{|B|} \text{adj } B$$

$$= \frac{1}{2} \begin{bmatrix} 2 & 0 \\ 0 & 1 \end{bmatrix}$$

$$= \begin{bmatrix} 1 & 0 \\ 0 & 1/2 \end{bmatrix}$$

$$\text{adj } B = \begin{bmatrix} 2 & 0 \\ 0 & 1 \end{bmatrix}$$

2.C PÁGINA 100 (CAPÍTULO 3)

$$|C| = 7(-1) - 7(3)$$

$$= -7 - 21$$

$$= -28$$

$$C_{11} = -1(-1)^{1+1} = -1(-1)^2 = -1(1) = -1$$

$$C_{12} = 3(-1)^{1+2} = 3(-1)^3 = 3(-1) = -3$$

$$C_{21} = 7(-1)^{2+1} = 7(-1)^3 = 7(-1) = -7$$

$$C_{22} = 7(-1)^{2+2} = 7(-1)^4 = 7(1) = 7$$

$$C = \begin{bmatrix} -1 & -3 \\ -7 & 7 \end{bmatrix}$$

$$C^{-1} = \frac{1}{|C|} \text{adj } C$$

$$= \frac{1}{-28} \begin{bmatrix} -1 & -7 \\ -3 & 7 \end{bmatrix}$$

$$\text{adj } C = \begin{bmatrix} -1 & -7 \\ -3 & 7 \end{bmatrix}$$

$$= \begin{bmatrix} 1/28 & 1/4 \\ 3/28 & -1/4 \end{bmatrix}$$

3.A PÁGINA 100 (CAPÍTULO 3)

$$|D| = 3(-1)^{1+1} \begin{vmatrix} 0 & 3 \\ 0 & 2 \end{vmatrix} + (-1)(-1)^{1+2} \begin{vmatrix} 1 & 3 \\ 1 & 2 \end{vmatrix} + 2(-1)^{1+3} \begin{vmatrix} 1 & 0 \\ 1 & 0 \end{vmatrix}$$

$$= 3(-1)^2 [0(2) - 3(0)] + (-1)(-1)^3 [1(2) - 3(1)] + 2(-1)^4 [1(0) - 0(1)]$$

$$= 3(1)(0 - 0) + (-1)(-1)(2 - 12) + 2(1)(0 - 0)$$

$$= 3(0) + 1(-10) + 2(0)$$

$$= 0 - 10 + 0$$

$$= -10 \Rightarrow \text{MATRIZ NÃO-SINGULAR}$$

$$\begin{aligned}
 C_{11} &= \begin{vmatrix} 0 & 3 \\ 0 & 2 \end{vmatrix} (-1)^{1+1} \\
 &= [0(2) - 3(0)] (-1)^2 \\
 &= (0 - 0)(1) \\
 &= 0(1) \\
 &= 0
 \end{aligned}$$

$$\begin{aligned}
 C_{12} &= \begin{vmatrix} 1 & 3 \\ 4 & 2 \end{vmatrix} (-1)^{1+2} \\
 &= [1(2) - 3(4)] (-1)^3 \\
 &= (2 - 12)(-1) \\
 &= (-10)(-1) \\
 &= 10
 \end{aligned}$$

$$\begin{aligned}
 C_{13} &= \begin{vmatrix} 1 & 0 \\ 4 & 0 \end{vmatrix} (-1)^{1+3} \\
 &= [1(0) - 0(4)] (-1)^4 \\
 &= (0 - 0)(1) \\
 &= 0(1) \\
 &= 0
 \end{aligned}$$

$$\begin{aligned}
 C_{21} &= \begin{vmatrix} -1 & 2 \\ 0 & 2 \end{vmatrix} (-1)^{2+1} \\
 &= [(-1)(2) - 2(0)] (-1)^3 \\
 &= (-2 - 0)(-1) \\
 &= (-2)(-1) \\
 &= 2
 \end{aligned}$$

$$\begin{aligned}
 C_{22} &= \begin{vmatrix} 3 & 2 \\ 4 & 2 \end{vmatrix} (-1)^{2+2} \\
 &= [3(2) - 2(4)] (-1)^4 \\
 &= (6 - 8)(1) \\
 &= (-2)(1) \\
 &= -2
 \end{aligned}$$

$$\begin{aligned}
 C_{23} &= \begin{vmatrix} 3 & -1 \\ 4 & 0 \end{vmatrix} (-1)^{2+3} \\
 &= [3(0) - (-1)(4)] (-1)^5 \\
 &= (0 + 4)(-1) \\
 &= (4)(-1) \\
 &= -4
 \end{aligned}$$

$$\begin{aligned}
 C_{31} &= \begin{vmatrix} -1 & 2 \\ 0 & 3 \end{vmatrix} (-1)^{3+1} \\
 &= [(-1)(3) - 2(0)] (-1)^4 \\
 &= (-3 - 0)(1) \\
 &= (-3)(1) \\
 &= -3
 \end{aligned}$$

$$\begin{aligned}
 C_{32} &= \begin{vmatrix} 3 & 2 \\ 1 & 3 \end{vmatrix} (-1)^{3+2} \\
 &= [3(3) - 2(1)] (-1)^5 \\
 &= (9 - 2)(-1) \\
 &= (7)(-1) \\
 &= -7
 \end{aligned}$$

$$\begin{aligned}
 C_{33} &= \begin{vmatrix} 3 & -1 \\ 1 & 0 \end{vmatrix} (-1)^{3+3} \\
 &= [3(0) - (-1)(1)] (-1)^6 \\
 &= (0 + 1)(1) \\
 &= (1)(1) \\
 &= 1
 \end{aligned}$$

$$C = \begin{vmatrix} 0 & 10 & 0 \\ 2 & -2 & -4 \\ -3 & -7 & 1 \end{vmatrix}$$

$$\text{adj } D = \begin{vmatrix} 0 & 2 & -3 \\ 10 & -2 & -7 \\ 0 & -4 & 1 \end{vmatrix}$$

$$D^{-1} = \frac{1}{|D|} \text{adj } D$$

$$= \frac{1}{10} \begin{bmatrix} 0 & 2 & -3 \\ 10 & -2 & -7 \\ 0 & -4 & 1 \end{bmatrix}$$

$$= \begin{bmatrix} 0 & -1/5 & 3/10 \\ -1 & 1/5 & 7/10 \\ 0 & 2/5 & -1/10 \end{bmatrix}$$

3.3 PÁGINA 100 (CAPÍTULO 5)

$$|E| = 4(-1)^{1+1} \begin{vmatrix} 3 & 3 \\ 0 & 1 \end{vmatrix} + (-2)(-1)^{1+2} \begin{vmatrix} 7 & 3 \\ 2 & 1 \end{vmatrix} + 1(-1)^{1+3} \begin{vmatrix} 7 & 3 \\ 2 & 0 \end{vmatrix}$$

$$= 4(-1)^2 [3(1) - 3(0)] + (-2)(-1)^3 [7(1) - 3(2)] + 1(-1)^1 [7(0) - 3(2)]$$

$$= 4(1)(3-0) + (-2)(-1)(7-6) + 1(1)(0-6)$$

$$= 4(3) + 2(1) + 1(-6)$$

$$= 12 + 2 - 6$$

$$= 8 \Rightarrow \text{MATRIZ NÃO-SINGULAR}$$

$$C_{11} = \begin{vmatrix} 3 & 3 \\ 0 & 1 \end{vmatrix} (-1)^{1+1}$$

$$C_{12} = \begin{vmatrix} 7 & 3 \\ 2 & 1 \end{vmatrix} (-1)^{1+2}$$

$$\begin{aligned}
 C_{11} &= [3(1) - 3(0)](-1)^2 \\
 &= (3 - 0)(1) \\
 &= 3(1) \\
 &= 3
 \end{aligned}$$

$$\begin{aligned}
 C_{12} &= [7(1) - 3(2)](-1)^3 \\
 &= (7 - 6)(-1) \\
 &= (1)(-1) \\
 &= -1
 \end{aligned}$$

$$\begin{aligned}
 C_{13} &= \begin{vmatrix} 7 & 3 \\ 2 & 0 \end{vmatrix} (-1)^{1+3} \\
 &= [7(0) - 3(2)](-1)^5 \\
 &= (0 - 6)(1) \\
 &= -6(1) \\
 &= -6
 \end{aligned}$$

$$\begin{aligned}
 C_{21} &= \begin{vmatrix} -2 & 1 \\ 0 & 1 \end{vmatrix} (-1)^{2+1} \\
 &= [-2(1) - 1(0)](-1)^3 \\
 &= (-2 - 0)(-1) \\
 &= (-2)(-1) \\
 &= 2
 \end{aligned}$$

$$\begin{aligned}
 C_{22} &= \begin{vmatrix} 5 & 1 \\ 2 & 1 \end{vmatrix} (-1)^{2+2} \\
 &= [5(1) - 1(2)](-1)^5 \\
 &= (5 - 2)(1) \\
 &= 2(1) \\
 &= 2
 \end{aligned}$$

$$\begin{aligned}
 C_{23} &= \begin{vmatrix} 5 & -2 \\ 2 & 0 \end{vmatrix} (-1)^{2+3} \\
 &= [5(0) - (-2)(2)](-1)^5 \\
 &= (0 + 4)(-1) \\
 &= 4(-1) \\
 &= -4
 \end{aligned}$$

$$\begin{aligned}
 C_{31} &= \begin{vmatrix} -2 & 1 \\ 3 & 3 \end{vmatrix} (-1)^{3+1} \\
 &= [-2(3) - 1(3)](-1)^5 \\
 &= (-6 - 3)(1) \\
 &= -9(1) \\
 &= -9
 \end{aligned}$$

$$\begin{aligned}
 C_{32} &= \begin{vmatrix} 5 & 1 \\ 7 & 3 \end{vmatrix} (-1)^{3+2} \\
 &= [5(3) - 1(7)](-1)^5 \\
 &= (12 - 7)(-1) \\
 &= (5)(-1) \\
 &= -5
 \end{aligned}$$

$$\begin{aligned}
 C_{33} &= \begin{vmatrix} 5 & -2 \\ 7 & 3 \end{vmatrix} (-1)^{3+3} \\
 &= [5(3) - (-2)(7)](-1)^6 \\
 &= (12 + 14)(1)
 \end{aligned}$$

$$\begin{aligned}
 C_{33} &= 26(1) \\
 &= 26
 \end{aligned}$$

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$$C = \begin{bmatrix} 3 & -1 & -6 \\ 2 & 2 & -4 \\ -9 & -5 & 26 \end{bmatrix}$$

$$\text{adj } E = \begin{bmatrix} 3 & 2 & -9 \\ -1 & 2 & -5 \\ -6 & -4 & 26 \end{bmatrix}$$

$$E^{-1} = \frac{1}{|E|} \text{adj } E$$

$$= \frac{1}{8} \begin{bmatrix} 3 & 2 & -9 \\ -1 & 2 & -5 \\ -6 & -4 & 26 \end{bmatrix}$$

$$= \begin{bmatrix} 3/8 & 1/4 & -9/8 \\ -1/8 & 1/4 & -5/8 \\ -3/4 & -1/2 & 13/4 \end{bmatrix}$$

3.C PÁGINA 100 (CAPÍTULO 5)

ESSE EXERCÍCIO ESTÁ RESOLVIDO NA PÁGINA 86
DESTE CADEIRNO.

1A PÁGINA 104 (CAPÍTULO 5)

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

$$\begin{aligned} |A| &= 2(-2) - 1(3) \\ &= -4 - 3 \\ &= -7 \end{aligned}$$

$$A_1 = \begin{bmatrix} 2 & 1 \\ 8 & -2 \end{bmatrix} \quad |A_1| = 2(-2) - 1(8) \\ = -4 - 8 \\ = -12$$

$$A_2 = \begin{bmatrix} 2 & 2 \\ 3 & 8 \end{bmatrix} \quad |A_2| = 2(8) - 2(3) \\ = 16 - 6 \\ = 10$$

$$\bar{x}_1 = \frac{|A_1|}{|A|} \\ = \frac{-12}{-2} \\ = 6$$

$$\bar{x}_2 = \frac{|A_2|}{|A|} \\ = \frac{10}{-2} \\ = -5$$

1.3 PÁGINA 104 (CAPÍTULO 5)

$$B = \begin{bmatrix} 5 & -2 \\ 4 & 1 \end{bmatrix} \quad |B| = 5(1) - (-2)(4) \\ = 5 + 8 \\ = 13$$

$$B_1 = \begin{bmatrix} 15 & -2 \\ 12 & 1 \end{bmatrix} \quad |B_1| = 15(1) - (-2)(12) \\ = 15 + 24 \\ = 39$$

$$B_2 = \begin{bmatrix} 5 & 15 \\ 4 & 12 \end{bmatrix} \quad |B_2| = 5(12) - 15(4) \\ = 60 - 60 \\ = 0$$

$$\bar{x}_1 = \frac{|B_1|}{|B|} = \frac{39}{13} = 3 \quad \bar{x}_2 = \frac{|B_2|}{|B|} = \frac{0}{13} = 0$$

2.9 PÁGINA 104 (CAPÍTULO 3)

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

$$\begin{aligned} C_{11} &= (-1)^{1+1}(-2) \\ &= (-1)^2(-2) \\ &= 1(-2) \\ &= -2 \end{aligned}$$

$$\begin{aligned} C_{12} &= (-1)^{1+2}(3) \\ &= (-1)^3(3) \\ &= -1(3) \\ &= -3 \end{aligned}$$

$$\begin{aligned} C_{21} &= (-1)^{2+1}(1) \\ &= (-1)^3(1) \\ &= -1(1) \\ &= -1 \end{aligned}$$

$$\begin{aligned} C_{22} &= (-1)^{2+2}(2) \\ &= (-1)^4(2) \\ &= 1(2) \\ &= 2 \end{aligned}$$

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

$$\begin{aligned} |A| &= 2(-2) - 1(3) \\ &= -4 - 3 \\ &= -7 \end{aligned}$$

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

$$A^{-1} = \frac{1}{|A|} \text{adj } A$$

$$= -\frac{1}{7} \begin{bmatrix} -2 & -1 \\ -3 & 2 \end{bmatrix}$$

$$= \begin{bmatrix} 2/7 & 1/7 \\ 3/7 & -2/7 \end{bmatrix}$$

$$\begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{bmatrix} 2/7 & 1/7 \\ 3/7 & -2/7 \end{bmatrix} \cdot \begin{bmatrix} 28 \\ 8 \end{bmatrix}$$

$$= \begin{bmatrix} 48/7 + 8/7 \\ 72/7 - 16/7 \end{bmatrix}$$

$$= \begin{bmatrix} 56/7 \\ 56/7 \end{bmatrix}$$

$$= \begin{bmatrix} 8 \\ 8 \end{bmatrix}$$

2.B PÁGINA 104 (CAPÍTULO 5)

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

$$\begin{aligned} C_{11} &= (-1)^{1+1}(1) \\ &= (-1)^2(1) \\ &= 1(1) \\ &= 1 \end{aligned}$$

$$\begin{aligned} C_{12} &= (-1)^{1+2}(5) \\ &= (-1)^3(5) \\ &= -1(5) \\ &= -5 \end{aligned}$$

$$\begin{aligned} C_{21} &= (-1)^{2+1}(-2) \\ &= (-1)^3(-2) \\ &= -1(-2) \\ &= 2 \end{aligned}$$

$$\begin{aligned} C_{22} &= (-1)^{2+2}(3) \\ &= (-1)^4(3) \\ &= 1(3) \\ &= 3 \end{aligned}$$

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

$$\begin{aligned} |B| &= 3(1) - (-2)(5) \\ &= 3 + 10 \\ &= 13 \end{aligned}$$

$$\text{adj } B = \begin{bmatrix} 1 & 2 \\ -5 & 3 \end{bmatrix}$$

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$$B^{-1} = \frac{1}{|B|} \text{adj } B$$

$$= \frac{1}{13} \begin{bmatrix} 1 & 2 \\ -4 & 5 \end{bmatrix}$$

$$= \begin{bmatrix} 1/13 & 2/13 \\ -4/13 & 5/13 \end{bmatrix}$$

$$\begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{bmatrix} 1/13 & 2/13 \\ -4/13 & 5/13 \end{bmatrix} \cdot \begin{bmatrix} 15 \\ 12 \end{bmatrix}$$

$$= \begin{bmatrix} 15/13 + 24/13 \\ -60/13 + 60/13 \end{bmatrix}$$

$$= \begin{bmatrix} 39/13 \\ 0/13 \end{bmatrix}$$

$$= \begin{bmatrix} 3 \\ 0 \end{bmatrix}$$

SIM. AS SOLUÇÕES ASSIM OBTIDAS SÃO IDÊNTICAS ÀS ACHADAS PELA REGRA DE CRAMER.

3.A PÁGINA 104 (CAPÍTULO 5)

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

$$|A| = 2(-1)^{1+1} \begin{vmatrix} 3 & 2 \\ 0 & 3 \end{vmatrix} + (-1)(-1)^{1+2} \begin{vmatrix} 0 & 2 \\ 5 & 3 \end{vmatrix}$$

$$= 2(-1)^2 [3(3) - 2(0)] + (-1)(-1)^3 [0(3) - 2(5)]$$

$$= 2(1)(9 - 0) + (-1)(-1)(0 - 10)$$

$$= 2(9) + 1(-10)$$

$$\text{tilibra} = 18 - 10$$

$$= 8 \Rightarrow \text{MATRIZ NÃO-SINGULAR}$$

$$A_1 = \begin{bmatrix} 2 & -1 & 0 \\ 16 & 3 & 2 \\ 21 & 0 & 3 \end{bmatrix}$$

$$\begin{aligned} |A_1| &= 2(-1)^{1+1} \begin{vmatrix} 3 & 2 \\ 0 & 3 \end{vmatrix} + (-1)(-1)^{1+2} \begin{vmatrix} 16 & 2 \\ 21 & 3 \end{vmatrix} \\ &= 2(-1)^2 [3(3) - 2(0)] + (-1)(-1)^3 [16(3) - 2(21)] \\ &= 2(1)(9 - 0) + (-1)(-1)(48 - 42) \\ &= 2(9) + 1(6) \\ &= 18 + 6 \\ &= 24 \Rightarrow \text{MATRIZ N\~AO-SINGULAR} \end{aligned}$$

$$A_2 = \begin{bmatrix} 2 & 2 & 0 \\ 0 & 16 & 2 \\ 5 & 21 & 3 \end{bmatrix}$$

$$\begin{aligned} |A_2| &= 2(-1)^{1+1} \begin{vmatrix} 16 & 2 \\ 21 & 3 \end{vmatrix} + 2(-1)^{1+2} \begin{vmatrix} 0 & 2 \\ 5 & 3 \end{vmatrix} \\ &= 2(-1)^2 [16(3) - 2(21)] + 2(-1)^3 [0(3) - 2(5)] \\ &= 2(1)(48 - 42) + 2(-1)(0 - 10) \\ &= 2(6) - 2(-10) \\ &= 12 + 20 \\ &= 32 \Rightarrow \text{MATRIZ N\~AO-SINGULAR} \end{aligned}$$

$$A_3 = \begin{bmatrix} 2 & -1 & 2 \\ 0 & 3 & 16 \\ 5 & 0 & 21 \end{bmatrix}$$

$$|A_3| = 2(-1)^{1+1} \begin{vmatrix} 3 & 16 \\ 0 & 21 \end{vmatrix} + (-1)(-1)^{1+2} \begin{vmatrix} 0 & 16 \\ 5 & 21 \end{vmatrix} + 2(-1)^{1+3} \begin{vmatrix} 0 & 3 \\ 5 & 0 \end{vmatrix}$$

$$\begin{aligned}
 |A_3| &= 2(-1)^2 [3(21) - 16(0)] + (-1)(-1)^3 [0(21) - 16(5)] + 2(-1)^4 [0(0) - 3(5)] \\
 &= 2(1)(63 - 0) + (-1)(-1)(0 - 80) + 2(1)(0 - 15) \\
 &= 2(63) + 1(-80) + 2(-15) \\
 &= 126 - 80 - 30 = 16
 \end{aligned}$$

$$\begin{aligned}
 \bar{x}_1 &= \frac{|A_1|}{|A|} & \bar{x}_2 &= \frac{|A_2|}{|A|} & \bar{x}_3 &= \frac{|A_3|}{|A|} \\
 &= \frac{21^3}{81} = 3 & &= \frac{32^3}{81} = 4 & &= \frac{16^2}{81} = 2
 \end{aligned}$$

3.3 PÁGINA 105 (CAPÍTULO 5)

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

$$\begin{aligned}
 |A| &= (-1)(-1)^{1+1} \begin{vmatrix} -1 & 1 \\ 1 & -1 \end{vmatrix} + 1(-1)^{1+2} \begin{vmatrix} 1 & 1 \\ 1 & -1 \end{vmatrix} + 1(-1)^{1+3} \begin{vmatrix} 1 & -1 \\ 1 & 1 \end{vmatrix} \\
 &= (-1)(-1)^2 [-1(-1) - 1(1)] + 1(-1)^3 [1(-1) - 1(1)] + 1(-1)^4 [1(1) - (-1)(1)] \\
 &= (-1)(1)(1 - 1) + 1(-1)(-1 - 1) + 1(1)(1 + 1) \\
 &= -1(0) - 1(-2) + 1(2) \\
 &= 0 + 2 + 2 \\
 &= 4 \Rightarrow \text{MATRIZ NÃO-SINGULAR}
 \end{aligned}$$

$$A_1 = \begin{bmatrix} a & 1 & 1 \\ b & -1 & 1 \\ c & 1 & -1 \end{bmatrix}$$

$$|A_1| = a(-1)^{1+1} \begin{vmatrix} -1 & 1 \\ 1 & -1 \end{vmatrix} + 1(-1)^{1+2} \begin{vmatrix} b & 1 \\ c & -1 \end{vmatrix} + 1(-1)^{1+3} \begin{vmatrix} b & -1 \\ c & 1 \end{vmatrix}$$

$$\begin{aligned}
 |A_1| &= a(-1)^2[-1(-1)-1(1)]+1(-1)^3[b(-1)-1(c)]+1(-1)^4[b(1)-(-1)(c)] \\
 &= a(1)(1-1)+1(-1)(-b-c)+1(1)(b+c) \\
 &= a(0)-1(-b-c)+1(b+c) \\
 &= 0+b+c+b+c \\
 &= 2b+2c = 2(b+c)
 \end{aligned}$$

$$A_2 = \begin{bmatrix} -1 & a & 1 \\ 1 & b & 1 \\ 1 & c & -1 \end{bmatrix}$$

$$\begin{aligned}
 |A_2| &= -1(-1)^{1+1} \begin{vmatrix} b & 1 \\ c & -1 \end{vmatrix} + a(-1)^{1+2} \begin{vmatrix} 1 & 1 \\ 1 & -1 \end{vmatrix} + 1(-1)^{1+3} \begin{vmatrix} 1 & b \\ 1 & c \end{vmatrix} \\
 &= -1(-1)^2[b(-1)-1(c)]+a(-1)^3[1(-1)-1(1)]+1(-1)^4[1(c)-b(1)] \\
 &= -1(1)(-b-c)+a(-1)(-1-1)+1(1)(c-b) \\
 &= -1(-b-c)-a(-2)+1(c-b) \\
 &= b+c+2a+c-b = 2a+2c = 2(a+c)
 \end{aligned}$$

$$A_3 = \begin{bmatrix} -1 & 1 & a \\ 1 & -1 & b \\ 1 & 1 & c \end{bmatrix}$$

$$\begin{aligned}
 |A_3| &= -1(-1)^{1+1} \begin{vmatrix} -1 & b \\ 1 & c \end{vmatrix} + 1(-1)^{1+2} \begin{vmatrix} 1 & b \\ 1 & c \end{vmatrix} + a(-1)^{1+3} \begin{vmatrix} 1 & -1 \\ 1 & 1 \end{vmatrix} \\
 &= -1(-1)^2[-1(c)-b(1)]+1(-1)^3[1(c)-b(1)]+a(-1)^4[1(1)-(-1)(1)] \\
 &= -1(1)(-c-b)+1(-1)(c-b)+a(1)(1+1) \\
 &= -1(-c-b)-1(c-b)+a(2) \\
 &= c+b-c+b+2a = 2a+2b = 2(a+b)
 \end{aligned}$$

$$\begin{aligned}
 \bar{X}_1 &= \frac{|A_1|}{|A|} = \frac{2(b+c)}{2} = b+c \\
 \bar{X}_2 &= \frac{|A_2|}{|A|} = \frac{2(a+c)}{2} = a+c \\
 \bar{X}_3 &= \frac{|A_3|}{|A|} = \frac{2(a+b)}{2} = a+b
 \end{aligned}$$

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$$\bar{x}_3 = \frac{|A_3|}{|A|} \rightarrow \bar{x}_3 = \frac{a+b}{2}$$
$$= \frac{2(a+b)}{4}$$

4 PÁGINAS (CAPÍTULO 5)

2) PÁGINA 179 (CAPÍTULO 3)

$$Y = C + I_0 + G_0$$

$$-C + Y = I_0 + G_0$$

$$C = a + b(Y - T)$$

$$C = a + bY - bT$$

$$C - bY + bT = a$$

$$T = d + tY$$

$$-tY + T = d$$

$$\begin{cases} Y - C + 0T = I_0 + G_0 \\ -bY + C + bT = a \\ -tY + 0C + T = d \end{cases}$$

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

$$|A| = -1(-1)^{1+2} \begin{vmatrix} -b & b \\ -t & 1 \end{vmatrix} + 1(-1)^{2+2} \begin{vmatrix} 1 & 0 \\ -t & 1 \end{vmatrix}$$

$$= -1(-1)^3 [-b(1) - b(-t)] + 1(-1)^4 [1(1) - 0(-t)]$$

$$= -1(-1)(-b + bt) + 1(1)(1 - 0)$$

$$= 1(-b + bt) + 1(1)$$

$$= -b + bt + 1$$

$$= 1 - b + bt$$

$$= 1 - b(1 - t)$$

$$A_1 = \begin{bmatrix} I_0 + G_0 & -1 & 0 \\ a & 1 & b \\ d & 0 & 1 \end{bmatrix}$$

$$\begin{aligned} |A_1| &= -1(-1)^{1+2} \begin{vmatrix} a & b \\ d & 1 \end{vmatrix} + 1(-1)^{2+2} \begin{vmatrix} I_0 + G_0 & 0 \\ d & 1 \end{vmatrix} \\ &= -1(-1)^3 [a(1) - b(d)] + 1(-1)^4 [I_0 + G_0(1) - 0(d)] \\ &= -1(-1)(a - bd) + 1(1)(I_0 + G_0 - 0) \\ &= 1(a - bd) + 1(I_0 + G_0) \\ &= a - bd + I_0 + G_0 \end{aligned}$$

$$A_2 = \begin{bmatrix} 1 & I_0 + G_0 & 0 \\ -b & a & b \\ -t & d & 1 \end{bmatrix}$$

$$\begin{aligned} |A_2| &= b(-1)^{2+3} \begin{vmatrix} 1 & I_0 + G_0 \\ -t & d \end{vmatrix} + 1(-1)^{3+3} \begin{vmatrix} 1 & I_0 + G_0 \\ -b & a \end{vmatrix} \\ &= b(-1)^5 [1(d) - (-t)(I_0 + G_0)] + 1(-1)^6 [1(a) - (I_0 + G_0)(-b)] \\ &= b(-1) [d + t(I_0 + G_0)] + 1(1) [a + b(I_0 + G_0)] \\ &= -b[d + t(I_0 + G_0)] + 1[a + b(I_0 + G_0)] \end{aligned}$$

2) PÁGINA 175 (CAPÍTULO 5)

$$\begin{bmatrix} 0,8 & -0,3 & -0,2 \\ -0,5 & 0,9 & -0,2 \\ -0,1 & -0,3 & 0,8 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} 20 \\ 5 \\ 10 \end{bmatrix}$$

$$A = \begin{bmatrix} 0,8 & -0,3 & -0,2 \\ -0,5 & 0,9 & -0,2 \\ -0,1 & -0,3 & 0,8 \end{bmatrix}$$

$$\begin{aligned} |A| &= 0,8(-1)^{1+1} \begin{vmatrix} 0,9 & -0,2 \\ -0,3 & 0,8 \end{vmatrix} + (-0,3)(-1)^{1+2} \begin{vmatrix} -0,5 & -0,2 \\ -0,1 & 0,8 \end{vmatrix} + (-0,2)(-1)^{1+3} \begin{vmatrix} -0,5 & 0,9 \\ -0,1 & -0,3 \end{vmatrix} \\ &= 0,8(-1)^2 [0,9(0,8) - (-0,2)(-0,3)] + (-0,3)(-1)^3 [-0,5(0,8) - (-0,2)(-0,1)] + (-0,2)(-1)^4 \\ &\quad [(-0,5)(-0,3) - 0,9(-0,1)] \\ &= 0,8(1)[0,72 - (0,06)] + (-0,3)(-1)[-0,32 - (0,02)] + (-0,2)(1)(0,12 + 0,09) \end{aligned}$$

$$\begin{aligned}
 |A| &= 0,8(0,72 - 0,06) + 0,3(-0,32 - 0,02) - 0,2(0,21) \\
 &= 0,8(0,66) + 0,3(-0,34) - 0,042 \\
 &= 0,528 - 0,102 - 0,042 \\
 &= 0,384 \approx 0,38
 \end{aligned}$$

$$A_1 = \begin{bmatrix} 20 & -0,3 & -0,2 \\ 5 & 0,9 & -0,2 \\ 10 & -0,3 & 0,8 \end{bmatrix}$$

$$\begin{aligned}
 |A_1| &= 20(-1)^{1+1} \begin{vmatrix} 0,9 & -0,2 \\ -0,3 & 0,8 \end{vmatrix} + (-0,3)(-1)^{1+2} \begin{vmatrix} 5 & -0,2 \\ 10 & 0,8 \end{vmatrix} + (-0,2)(-1)^{1+3} \begin{vmatrix} 5 & 0,9 \\ 10 & -0,3 \end{vmatrix} \\
 &= 20(-1)^2 [0,9(0,8) - (-0,2)(-0,3)] + (-0,3)(-1)^3 [5(0,8) - (-0,2)(10)] + (-0,2) \\
 &\quad (-1)^5 [5(-0,3) - 0,9(10)] \\
 &= 20(1)[0,72 - (0,06)] + (-0,3)(-1)[4 - (-2)] + (-0,2)(1)(-3,5 - 9) \\
 &= 20(0,72 - 0,06) + 0,3(4 + 2) - 0,2(-12,5) \\
 &= 20(0,66) + 0,3(6) + 2,50 \\
 &= 13,20 + 1,80 + 2,50 \\
 &= 17,50
 \end{aligned}$$

$$A_2 = \begin{bmatrix} 0,8 & 20 & -0,2 \\ -0,4 & 5 & -0,2 \\ -0,1 & 10 & 0,8 \end{bmatrix}$$

$$\begin{aligned}
 |A_2| &= 0,8(-1)^{1+1} \begin{vmatrix} 5 & -0,2 \\ 10 & 0,8 \end{vmatrix} + 20(-1)^{1+2} \begin{vmatrix} -0,4 & -0,2 \\ -0,1 & 0,8 \end{vmatrix} + (-0,2)(-1)^{1+3} \begin{vmatrix} -0,4 & 5 \\ -0,1 & 10 \end{vmatrix} \\
 &= 0,8(-1)^2 [5(0,8) - (-0,2)(10)] + 20(-1)^3 [-0,4(0,8) - (-0,2)(-0,1)] + (-0,2) \\
 &\quad (-1)^5 [-0,4(10) - 5(-0,1)] \\
 &= 0,8(1)[4 - (-2)] + 20(-1)[-0,32 - (0,02)] + (-0,2)(1)(-4 + 0,50) \\
 &= 0,8(4 + 2) - 20(-0,32 - 0,02) - 0,2(-3,50) \\
 &= 0,8(6) - 20(-0,34) + 0,70
 \end{aligned}$$

$$|A_2| = 4,80 + 6,80 + 0,70 \\ = 12,30$$

$$A_3 = \begin{bmatrix} 0,8 & -0,3 & 20 \\ -0,4 & 0,9 & 5 \\ -0,1 & -0,3 & 10 \end{bmatrix}$$

$$\begin{aligned} |A_3| &= 0,8(-1)^{1+1} \begin{vmatrix} 0,9 & 5 \\ -0,3 & 10 \end{vmatrix} + (-0,3)(-1)^{1+2} \begin{vmatrix} -0,4 & 5 \\ -0,1 & 10 \end{vmatrix} + 20(-1)^{1+3} \begin{vmatrix} -0,4 & 0,9 \\ -0,1 & -0,3 \end{vmatrix} \\ &= 0,8(-1)^2 [0,9(10) - 5(-0,3)] + (-0,3)(-1)^3 [-0,4(10) - 5(-0,1)] + 20(-1)^3 [-0,4 \\ &\quad (-0,3) - 0,9(-0,1)] \\ &= 0,8(1)(9 + 1,50) + (-0,3)(-1)(-4 + 0,50) + 20(1)(0,12 + 0,09) \\ &= 0,8(10,50) + 0,3(-3,50) + 20(0,21) \\ &= 8,40 - 1,05 + 4,20 \\ &= 2,10 \end{aligned}$$

$$\begin{aligned} \bar{X}_1 &= \frac{|A_1|}{|A|} \\ &= \frac{17,10}{0,38} \\ &= 45 \end{aligned}$$

$$\begin{aligned} \bar{X}_2 &= \frac{|A_2|}{|A|} \\ &= \frac{12,30}{0,38} \\ &= 32,36842105 \\ &\approx 32,37 \end{aligned}$$

$$\begin{aligned} \bar{X}_3 &= \frac{|A_3|}{|A|} \\ &= \frac{2,10}{0,38} \\ &= 5,526315789 \\ &\approx 5,53 \end{aligned}$$

3) PÁGINA 115 (CAPÍTULO 5)

$$\begin{aligned} QP_1 &= a_{01} \cdot \bar{X}_1 \\ &= 0,7(45) \\ &= 31,50 \end{aligned}$$

$$\begin{aligned} QP_2 &= a_{02} \cdot \bar{X}_2 \\ &= 0,3(32,37) \\ &= 9,71 \end{aligned}$$

$$\begin{aligned} QP_3 &= a_{03} \cdot \bar{X}_3 \\ &= 0,4(5,53) \\ &= 2,21 \end{aligned}$$

4) PÁGINA IV (CAPÍTULO 5)

$$\begin{bmatrix} 0,3 & 0,4 & 0,2 \\ 0,2 & 0,0 & 0,5 \\ 0,1 & 0,3 & 0,1 \end{bmatrix} \cdot \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} 100 \\ 50 \\ 50 \end{bmatrix}$$

$$A = \begin{bmatrix} 0,3 & 0,4 & 0,2 \\ 0,2 & 0,0 & 0,5 \\ 0,1 & 0,3 & 0,1 \end{bmatrix}$$

$$\begin{aligned} |A| &= 0,3(-1)^{1+1} \begin{vmatrix} 0,0 & 0,5 \\ 0,3 & 0,1 \end{vmatrix} + 0,4(-1)^{1+2} \begin{vmatrix} 0,2 & 0,5 \\ 0,1 & 0,1 \end{vmatrix} + 0,2(-1)^{1+3} \begin{vmatrix} 0,2 & 0,0 \\ 0,1 & 0,3 \end{vmatrix} \\ &= 0,3(-1)^2 [0,0(0,1) - 0,5(0,3)] + 0,4(-1)^3 [0,2(0,1) - 0,5(0,1)] + 0,2(-1)^5 [0,2(0,3) - 0,0(0,1)] \\ &= 0,3(1)(0 - 0,15) + 0,4(-1)(0,02 - 0,05) + 0,2(1)(0,06 - 0) \\ &= 0,3(-0,15) - 0,4(-0,03) + 0,2(0,06) \\ &= -0,045 + 0,012 + 0,012 \\ &= -0,021 \\ &\approx -0,02 \end{aligned}$$

$$A_1 = \begin{bmatrix} 100 & 0,4 & 0,2 \\ 50 & 0,0 & 0,5 \\ 50 & 0,3 & 0,1 \end{bmatrix}$$

$$\begin{aligned} |A_1| &= 100(-1)^{1+1} \begin{vmatrix} 0,0 & 0,5 \\ 0,3 & 0,1 \end{vmatrix} + 0,4(-1)^{1+2} \begin{vmatrix} 50 & 0,5 \\ 50 & 0,1 \end{vmatrix} + 0,2(-1)^{1+3} \begin{vmatrix} 50 & 0,0 \\ 50 & 0,3 \end{vmatrix} \\ &= 100(-1)^2 [0,0(0,1) - 0,5(0,3)] + 0,4(-1)^3 [50(0,1) - 0,5(50)] + 0,2(-1)^5 [50(0,3) - 0,0(50)] \\ &= 100(1)(0 - 0,15) + 0,4(-1)(5 - 25) + 0,2(1)(15 - 0) \\ &= 100(-0,15) - 0,4(-20) + 0,2(15) \\ &= -15 + 8,40 + 3,00 \end{aligned}$$

libra - 4,20

$$A_2 = \begin{bmatrix} 0,3 & 100 & 0,2 \\ 0,2 & 50 & 0,5 \\ 0,1 & 50 & 0,1 \end{bmatrix}$$

$$\begin{aligned} |A_2| &= 0,3(-1)^{1+1} \begin{vmatrix} 50 & 0,5 \\ 50 & 0,1 \end{vmatrix} + 100(-1)^{1+2} \begin{vmatrix} 0,2 & 0,5 \\ 0,1 & 0,1 \end{vmatrix} + 0,2(-1)^{1+3} \begin{vmatrix} 0,2 & 50 \\ 0,1 & 50 \end{vmatrix} \\ &= 0,3(-1)^2 [50(0,1) - 0,5(50)] + 100(-1)^3 [0,2(0,1) - 0,5(0,1)] + 0,2(-1)^4 [0,2(50) - 50(0,1)] \\ &= 0,3(1)(5 - 25) + 100(-1)(0,02 - 0,05) + 0,2(1)(10 - 5) \\ &= 0,3(-20) - 100(-0,03) + 0,2(5) \\ &= -6,30 + 3 + 1,20 \\ &= -2,10 \end{aligned}$$

$$A_3 = \begin{bmatrix} 0,3 & 0,5 & 100 \\ 0,2 & 0,0 & 50 \\ 0,1 & 0,3 & 50 \end{bmatrix}$$

$$\begin{aligned} |A_3| &= 0,3(-1)^{1+1} \begin{vmatrix} 0,0 & 50 \\ 0,3 & 50 \end{vmatrix} + 0,5(-1)^{1+2} \begin{vmatrix} 0,2 & 50 \\ 0,1 & 50 \end{vmatrix} + 100(-1)^{1+3} \begin{vmatrix} 0,2 & 0,0 \\ 0,1 & 0,3 \end{vmatrix} \\ &= 0,3(-1)^2 [0,0(50) - 50(0,3)] + 0,5(-1)^3 [0,2(50) - 50(0,1)] + 100(-1)^4 [0,2(0,3) - 0,0(0,1)] \\ &= 0,3(1)(0 - 15) + 0,5(-1)(10 - 5) + 100(1)(0,06 - 0) \\ &= 0,3(-15) - 0,5(5) + 100(0,06) \\ &= -4,50 - 2,50 + 6 \\ &= 0 \end{aligned}$$

$$\bar{X}_1 = \frac{|A_1|}{|A|}$$

$$= \frac{-4,20}{-0,02}$$

$$= 210$$

$$\bar{X}_2 = \frac{|A_2|}{|A|}$$

$$= \frac{-2,10}{-0,02}$$

$$= 105$$

$$\bar{X}_3 = \frac{|A_3|}{|A|}$$

$$= \frac{0}{-0,02}$$

$$= 0$$

3-C PÁGINA 100 (CAPÍTULO 3)

$$\begin{aligned}
 |F| &= 2(-1)^{1+1} \begin{vmatrix} 0 & 1 \\ 1 & 0 \end{vmatrix} \\
 &= 2(-1)^2 [0(0) - 1(1)] \\
 &= 2(1)(0 - 1) \\
 &= 2(-1) \\
 &= -2
 \end{aligned}$$

$$\begin{aligned}
 C_{11} &= (-1)^{1+1} \begin{vmatrix} 0 & 1 \\ 1 & 0 \end{vmatrix} \\
 &= (-1)^2 [0(0) - 1(1)] \\
 &= 1(0 - 1) \\
 &= 1(-1) \\
 &= -1
 \end{aligned}$$

$$\begin{aligned}
 C_{12} &= (-1)^{1+2} \begin{vmatrix} 0 & 1 \\ 0 & 0 \end{vmatrix} \\
 &= (-1)^3 [0(0) - 1(0)] \\
 &= -1(0 - 0) \\
 &= -1(0) \\
 &= 0
 \end{aligned}$$

$$\begin{aligned}
 C_{13} &= (-1)^{1+3} \begin{vmatrix} 0 & 0 \\ 0 & 1 \end{vmatrix} \\
 &= (-1)^4 [0(1) - 0(0)] \\
 &= 1(0 - 0) \\
 &= 1(0) \\
 &= 0
 \end{aligned}$$

$$\begin{aligned}
 C_{21} &= (-1)^{2+1} \begin{vmatrix} 0 & 0 \\ 1 & 0 \end{vmatrix} \\
 &= (-1)^3 [0(0) - 0(1)] \\
 &= -1(0 - 0) \\
 &= -1(0) \\
 &= 0
 \end{aligned}$$

$$\begin{aligned}
 C_{22} &= (-1)^{2+2} \begin{vmatrix} 1 & 0 \\ 0 & 0 \end{vmatrix} \\
 &= (-1)^4 [1(0) - 0(0)] \\
 &= 1(0 - 0) \\
 &= 1(0) \\
 &= 0
 \end{aligned}$$

$$\begin{aligned}
 C_{23} &= (-1)^{2+3} \begin{vmatrix} 1 & 0 \\ 0 & 1 \end{vmatrix} \\
 &= (-1)^5 [1(1) - 0(0)] \\
 &= -1(1 - 0) \\
 &= -1(1) \\
 &= -1
 \end{aligned}$$

$$C_{31} = (-1)^{3+1} \begin{vmatrix} 0 & 0 \\ 0 & 1 \end{vmatrix}$$

$$= (-1)^4 [0(1) - 0(0)]$$

$$= 1(0 - 0)$$

$$= 1(0)$$

$$= 0$$

$$C_{32} = (-1)^{3+2} \begin{vmatrix} 1 & 0 \\ 0 & 1 \end{vmatrix}$$

$$= (-1)^5 [1(1) - 0(0)]$$

$$= -1(1 - 0)$$

$$= -1(1)$$

$$= -1$$

$$C_{33} = (-1)^{3+3} \begin{vmatrix} 1 & 0 \\ 0 & 0 \end{vmatrix}$$

$$= (-1)^6 [1(0) - 0(0)]$$

$$= 1(0 - 0)$$

$$= 1(0)$$

$$= 0$$

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

$$\text{adj } F = C'$$

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

$$F^{-1} = \frac{1}{|F|} \text{adj } F$$

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

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

$$= \begin{bmatrix} 1 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & 1 & 0 \end{bmatrix}$$