

D S T Q Q S S  
D L M M J V S

LISTA 3 GA

30

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

$$X = A^{-1} \cdot B$$

$$\text{cof}(A) = \begin{pmatrix} 11 & -13 & 7 \\ -7 & 11 & -9 \\ 1 & -1 & 1 \end{pmatrix} A^{-1} = \begin{pmatrix} 11/10 & -7/10 & 1/10 \\ -13/10 & 11/10 & -1/10 \\ 7/10 & -9/10 & 1/10 \end{pmatrix} \begin{pmatrix} 1 \\ 2 \\ -3 \end{pmatrix}$$

$$X = \begin{pmatrix} 11 + (-7)(-3) \\ -13 + 22 + 3 \\ 7 + (-16) - 3 \end{pmatrix} = \begin{pmatrix} 1/10 \\ 12/10 \\ -14/10 \end{pmatrix} = X = \begin{pmatrix} 0,1 \\ 1,2 \\ -1,4 \end{pmatrix}$$

$$2) a) \begin{pmatrix} 3 & -4 \\ -2 & 1 \end{pmatrix} \begin{pmatrix} 3/5 & -2/5 \\ -4/5 & 1/5 \end{pmatrix} \begin{pmatrix} 2 \\ -1 \end{pmatrix} \begin{pmatrix} 8/5 \\ -9/5 \end{pmatrix} = X$$

det = -5

$$b) Y = \begin{pmatrix} 1 & 3 \\ 2 & 7 \end{pmatrix} \begin{pmatrix} 2 & 3 \\ 5 & 5 \end{pmatrix} \begin{pmatrix} 1 & 2 \\ 3 & 5 \end{pmatrix}^{-1} Y = \begin{pmatrix} -1 & 0 \\ -3 & 2 \end{pmatrix} \begin{pmatrix} -5 & 3 \\ 2 & -1 \end{pmatrix} = \begin{pmatrix} 5 & -3 \\ 19 & -11 \end{pmatrix}$$

det = -1

$$c) W = \begin{pmatrix} 1 & 0 & 0 \\ 2 & -1 & 0 \\ 2 & 3 & 1 \end{pmatrix} \begin{pmatrix} 5 \\ 7 \\ 2 \end{pmatrix} = \begin{pmatrix} +1 & 0 & 0 \\ -2 & -1 & 0 \\ -8 & -3 & 1 \end{pmatrix} \begin{pmatrix} 5 \\ 7 \\ 2 \end{pmatrix}$$

det = -1

$$W = \begin{pmatrix} 5 \\ -17 \\ -59 \end{pmatrix}$$

3) a)  $x = A^{-1} \cdot c$

b)  $A(B+x) =$

$x = T - B$

c)  $x = B^{-1} \cdot A^{-1}$

d)  $x = (AB)^{-1}$

$x = B$

e)  $x = A^T$

f)  $x = 2$

4) a)  $3x - 4y$

$2x + 6y$

$x = \frac{78}{26}$

impossible

b)  $5x + 8y$

$10x + 16y$

c)  $x + 2y$

$2x - 3y$

$x = -7/-7 =$

d)  $\begin{pmatrix} 3 \\ 2 \\ 1 \end{pmatrix}$

$(36 - 4)$

$(36 - 4)$

$(36 - 4)$

$(36 - 4)$

$(36 - 4)$

$(36 - 4)$

$(36 - 4)$



3) a)  $x = A^{-1} \cdot C \cdot B^{-1}$

b)  $A(B+x) = A$

$x = I - B$

c)  $x = B^{-1} A^{-1}$

d)  $x = (AB) \cdot A^{-1}$

$x = B$

e)  $x = A^T \cdot A^{-1} \cdot (B^T)^{-1} \cdot B^{-1}$

f)  $x = 2 \cdot A^{-1} \cdot 3B$

4) a)  $3x - 4y = 1$

$2x + 6y = 18$

$\begin{pmatrix} 3 & -4 \\ 2 & 6 \end{pmatrix}$

$\det = 26$

$\begin{pmatrix} 1 & -4 \\ 18 & 6 \end{pmatrix}$

$\det x = 78$

$\begin{pmatrix} 3 & 1 \\ 2 & 18 \end{pmatrix}$

$\det y = 52$

$x = \frac{78}{26} = 3, y = \frac{52}{26} = 2$

→ impossible

b)  $5x + 8y = 34$

$10x + 16y = 50$

$\begin{pmatrix} 5 & 8 \\ 10 & 16 \end{pmatrix}$

$\det = 0$

$\begin{pmatrix} 34 & 8 \\ 50 & 16 \end{pmatrix}$

$\det x = -144$

$\begin{pmatrix} 5 & 34 \\ 10 & 50 \end{pmatrix}$

$\det y = -90$

c)  $x + 2y = 5$

$2x - 3y = -4$

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

$\det = -7$

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

$\det x = -7$

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

$\det y = +14$

$x = -7/-7 = 1, y = -14/-7 = 2$

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

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

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

$(36 - 4 + 20) - (20 + 12 - 12)$

$\det = 32$

$\det y = 64$

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

$(36 - 16 + 40) - (20 + 24 - 48)$

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

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

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

$(96 + 16 - 40) - (-80 + 32 + 24)$

$\det x = 96$

$\det z = 32$

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

$(48 - 8 - 32) - (-32 + 24 - 16)$



D S T Q Q S S  
D L M M J V S

2 3 3

e) 
$$\begin{vmatrix} 1 & 2 & -1 \\ 2 & -1 & 3 \\ 3 & 3 & -2 \end{vmatrix} \begin{vmatrix} 1 & 2 \\ 2 & -1 \\ 3 & 3 \end{vmatrix} \begin{vmatrix} 2 & 2 & -1 \\ 9 & -1 & 3 \\ 3 & 3 & -2 \end{vmatrix} \begin{vmatrix} 2 & 2 \\ 9 & -1 \\ 3 & 3 \end{vmatrix} \begin{vmatrix} 1 & 2 & -1 \\ 2 & 9 & 3 \\ 3 & 3 & -2 \end{vmatrix} \begin{vmatrix} 1 & 2 \\ 2 & 9 \\ 3 & 3 \end{vmatrix}$$

$(2+18-6) - (3 \cdot 9 - 8) \quad (4+18-27) - (3-36+18) \quad (-18+18-6) - (-27-9-8)$

$\text{Det} = 10 \quad \text{Det} x = 10 \quad \text{Det} y = 20$

$$\begin{vmatrix} 1 & 2 & 2 \\ 2 & -1 & 9 \\ 3 & 3 & 3 \end{vmatrix} \begin{vmatrix} 1 & 2 \\ 2 & -1 \\ 3 & 3 \end{vmatrix}$$

$X = 1 \quad Y = 2 \quad Z = 3$

$(-3+54+12) - (-6+27+12)$

$\text{Det} z = 30$

f) 
$$\begin{vmatrix} 1 & 0 & 3 \\ 2 & -4 & 0 \\ 3 & -2 & -5 \end{vmatrix} \begin{vmatrix} 1 & 0 \\ 2 & -4 \\ 3 & -2 \end{vmatrix} \begin{vmatrix} -8 & -4 & 26 \\ -8 & 0 & 3 \\ -4 & -4 & 0 \end{vmatrix} \begin{vmatrix} -8 & 0 \\ -4 & -4 \\ 26 & -2 \end{vmatrix}$$

$(20+0-12) - (-36+0+0) \quad (-160+0+24) - (-312+0+0)$

$\text{Det} = 44 \quad \text{Det} x = 176$

$$\begin{vmatrix} 1 & -8 & 3 \\ 2 & -4 & 0 \\ 3 & 26 & -5 \end{vmatrix} \begin{vmatrix} 1 & -8 \\ 2 & -4 \\ 3 & 26 \end{vmatrix} \begin{vmatrix} 1 & 0 & -8 \\ 2 & -4 & -4 \\ 3 & -2 & 26 \end{vmatrix} \begin{vmatrix} 1 & 0 \\ 2 & -4 \\ 3 & -2 \end{vmatrix}$$

$(20+0+156) - (-36+0+80) \quad (-104+0+32) - (96+8+0)$

$\text{Det} y = 132 \quad \text{Det} z = -176$

g) 
$$\begin{vmatrix} -1 & 2 & 3 \\ 3 & 4 & 6 \\ 3 & 2 & 3 \end{vmatrix} \begin{vmatrix} -1 & 2 \\ 3 & 4 \\ 3 & 2 \end{vmatrix}$$

$(12+36+18) - (36+12+18)$

$\text{Det} = 0$

Não é possível - POR CRAMER

5) 
$$\begin{cases} 3x - 4y = 0 \\ -6x + 8y = 0 \end{cases}$$
 INF

b) 
$$\begin{cases} x + y + z = 0 \\ 2x + 2y + 4z = 0 \\ x + y + 3z = 0 \end{cases}$$

c) 
$$\begin{cases} x + y + 2z = 0 \\ x - y - 3z = 0 \\ x + 4y = 0 \end{cases}$$

$$\begin{cases} -4xy = 9 - (-3) \\ 14y = 0 \end{cases}$$

6) a) 
$$\begin{cases} 3x + \dots \\ x - \dots \end{cases}$$

b) 
$$\begin{cases} 3x + 2m - 2 \\ mx - 4y = 0 \end{cases}$$

$$2m^2 - 2m + \dots$$

c) 
$$\begin{cases} x - 4y = \dots \\ x + my = \dots \\ x - y = \dots \end{cases}$$

$$2 = 4$$

$$z = \dots$$



$$5) \begin{cases} 3x - 4y = 0 \\ -6x + 8y = 0 \end{cases} \quad \text{INFINITAS SOLUÇÕES}$$

$$b) \begin{cases} x + y + z = 0 \\ 2x + 2y + 4z = 0 \\ x + y + 3z = 0 \end{cases} \quad \begin{cases} 2x + 2y + 4z = 0 \\ x + y + 3z = 0 \\ z = 0 \end{cases} \quad \begin{cases} x + y + 0 = 0 \\ x = -y \end{cases} \quad \text{INFINITAS SOLUÇÕES}$$

$$c) \begin{cases} x + y + 2z = 0 \\ x - y - 3z = 0 \\ x + 4y = 0 \end{cases} \quad \begin{cases} x = -4y \\ -4y + y + 2z = 0 \\ -3y + 2z = 0 \end{cases} \quad \begin{cases} -3y = -2z \end{cases}$$

$$\begin{aligned} -4y - y &= (-3y \cdot 3) \\ 14y &= 0 \end{aligned} \quad \begin{aligned} &\text{UNICA SOLUÇÃO} \\ &\text{SOLUÇÃO NULA} \end{aligned}$$

$$6) a) \begin{cases} 3x + my = 2 \\ x - y = 1 \end{cases} \quad \begin{vmatrix} 3 & m \\ 1 & -1 \end{vmatrix} \neq 0 \quad m \neq -3$$

$$b) \begin{cases} 3x + (2m - 2) \cdot y = 1 \\ mx - 4y = 0 \end{cases} \quad \begin{vmatrix} 3 & 2m - 2 \\ m & -4 \end{vmatrix} \neq 0$$

$$\begin{aligned} 2m^2 - 2m + 12 &\neq 0 && \text{O SISTEMA É SEMPRE POSSÍVEL} \\ \Delta = (-2)^2 - 4 \cdot 2 \cdot 12 &= 4 - 96 = -92 && \text{PARA TODO } m \in \mathbb{R} \end{aligned}$$

$$c) \begin{cases} x - y = 2 \\ x + my = -2 \\ x - y - z = 4 \end{cases} \quad \begin{vmatrix} 1 & -1 & 0 \\ 1 & m & 1 \\ -1 & 1 & -1 \end{vmatrix} \quad \begin{vmatrix} 1 & -1 \\ 1 & m \end{vmatrix}$$

$$2 = 4 + z \quad (-m + 1 + 0) = (1 + 1)$$

$$z = -2 \quad -m \neq +1$$

$$m \neq -1$$



D S T Q Q S S  
 D L M M J V S

D) 
$$\begin{array}{ccc|ccc} m & 1 & -1 & m & 1 & \\ 1 & m & 1 & 1 & m & \neq 0 \\ 1 & -1 & 0 & -1 & -1 & \end{array}$$

$$(0 - 1 + 1) - (-m - m + 0)$$

$$2m \neq -2$$

$$m \neq -1$$

7) 
$$\begin{array}{l} x + y = 225 \\ 6x - 2y = 750 \end{array}$$

$$8x = 750 + 450$$

$$x = \frac{1200}{8} = 150$$

8) 
$$\begin{array}{l} x + y = 540 \\ 0,6x + 0,2y = 300 \end{array}$$

$$x + y = 540$$

$$-3x - y = -1500$$

$$-2x = -960$$

$$x = 480 \text{ km}$$

9) 
$$2x + 5y + 10z = 500$$

$$x = z$$

$$x + y + z = 92$$

$$2x + 5z = 92$$

$$x = 40/2$$

$$x = 20$$

$$z = 20$$

10) 
$$\begin{array}{l} x + y = 109 \\ x + z = 142 \\ y + z = 97 \end{array}$$

$$-y + z = 33$$

$$2z = 130$$

$$z = 65$$

$$y + 65 = 97$$

$$y = 97 - 65$$

$$y = 32$$

$$x + 32 = 109$$

$$x = 109 - 32$$

$$x = 77$$

LISTA 4 GA 4

1) a) 
$$\begin{array}{l} x = 2 \\ y = -1 \end{array}$$

D) 
$$\begin{array}{l} x = -32 \\ y = z + 2 \end{array}$$

2) a. 
$$\begin{array}{cc|c} 3 & -4 & \\ 1 & 3 & \end{array}$$

$$\begin{array}{cc|c} 1 & 0 & \\ 0 & 1 & \end{array}$$

b. 
$$\begin{array}{c|c} 5 & \\ 10 & \end{array}$$

c. 
$$\begin{array}{c|c} 1 & \\ 2 & \end{array}$$

$$\begin{array}{c|c} 1 & \\ 0 & \end{array}$$

d. 
$$\begin{array}{c|c} 1 & \\ 0 & \end{array}$$

$$\begin{array}{c|c} 1 & \\ 0 & \end{array}$$

$$\begin{array}{c|c} 1 & \\ 0 & \end{array}$$