Matemática C – Semi-Extensivo – V. 4

Exercícios

01) Usando a regra de Chió, temos:

$$\begin{vmatrix} 3+2 & -1+2 & 5+2 \\ 9-4 & 1-4 & 25-4 \\ 27+8 & -1+8 & 125+8 \end{vmatrix} = \begin{vmatrix} 5 & 1 & 7 \\ 5 & 3 & 21 \\ 35 & 7 & 133 \end{vmatrix}\begin{matrix} 5 & 1 \\ 5 & 3 \\ 35 & 7 \end{matrix}$$

= 1995 + 735 + 245 – 735 – 735 – 665
= 840

02) Este é um determinante de Vandermonde.
det A = (log 30 – log 3) . (log 300 – log 3) .
. (log 300 – log 30) . (log 3000 – log 3) .
. (log 3000 – log 30) . (log 3000 – log 300)
det A = (log 10) . log 100 . log 10 . log 1000 .
. log 100 . log 10
det A = 1 . 2 . 1 . 3 . 2 . 1
det A = 12

03) det (A) = 6 – 5
det (A) = 1

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

04) det A = 2 – 3
det A = –1

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

$\Rightarrow X = A^T - A^{-1}$

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

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

05) det A = 1

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

$$\Rightarrow X = \left(\begin{bmatrix} 1 & -1 \\ 0 & 1 \end{bmatrix} . \begin{bmatrix} 0 & 1 \\ 1 & -1 \end{bmatrix}\right)^T$$

$$X = \begin{pmatrix} -1 & 1+1 \\ 1 & -1 \end{pmatrix}^T \Rightarrow X = \begin{pmatrix} -1 & 1 \\ 2 & -1 \end{pmatrix}$$

06) A

$$\frac{\det A^{-1} . \cancel{\det B} . \det (A)}{\cancel{\det B}} =$$

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

$= \frac{1}{\det A} . \det A = 1$

07) B
M . A = 2B
$M = 2B . A^{-1}$
$\det M = \det (2B . A^{-1})$
$\det M = 2^2 . \det B . \det A^{-1}$

$\det M = 4 . \det B . \frac{1}{\det A}$

det B = 8 – 7
det B = 1
det A = 6 – 4
det A = 2

$\Rightarrow \det M = 4 . 1 . \frac{1}{2}$

det M = 2

$\det M^{-1} = \frac{1}{2}$

08) C
$\det A = 50 + 5x^2 + 4x - 2x^2 - 20 - 25x$
$\det A = 3x^2 - 21x + 30$
$3x^2 - 21x + 30 \neq 0 \div (7)$
$x^2 - 7x + 10 \neq 0$
$x' \neq 5$
$x'' \neq 2$

09) 51

10) 02

11) det (AB) = 8
det A . det B = 8
–1 . det B = 8
det B = –8
det A = –3 + 2
det A = –1

12) $\det (4A . B^{-1}) =$
$= \det (4A) . \det B^{-1}$

$= 4^n \det A . \frac{1}{\det B}$

$= \frac{4^n . a}{b}$

13) $M^2 - 2M = 0$
$\det (M^2 - 2M) = 0$
$\det M^2 - 2^2 \det M = 0$
det M . det M – 4 det M = 0
$\det^2 M - 4 \det M = 0$

$\det M . (\det M - 4) = 0 \Rightarrow \cancel{\det M = 0}$

det M – 4 = 0
det M = 4

14) $\det (B^T) = \det B = 96$
det A = 1,5
B = k . A
det B = det (k . A)
$96 = k^3 . \det A$
$96 = k^3 . 1,5$

$\frac{96}{1,5} = k^3$

$k = \sqrt[3]{64}$

$k = 4$

15) $A \,.\, B = C^{-1}$

$\det(A \,.\, B) = \det C^{-1}$

$\det A \,.\, \det B = \frac{1}{32}$

$\det A \,.\, \det(2A) = \frac{1}{32}$

$\det A \,.\, 2^3 \,.\, \det A = \frac{1}{32}$

$8\det^2 A = \frac{1}{32}$

$\det^2 A = \frac{1}{256}$

$\det A = \pm\frac{1}{16}$

$\Rightarrow |\det A| = \frac{1}{16}$

16) 96

$\det(A \,.\, 2B) =$

$= \det A \,.\, \det(2B)$

$= \det A \,.\, 2^3 \,.\, \det B$

$= 3 \,.\, 8 \,.\, 4$

$= 96$

17) Obtendo-se a inversa através de determinantes, sabe-se que:

$\det M = -1 + 6 + 6 + 4 - 9 - 1$

$\det M = 5$

$\Rightarrow x = \frac{1}{5} \,.\, (-1)^{1+1} \,.\, \begin{vmatrix} -1 & 3 \\ 3 & 1 \end{vmatrix}$

$x = \frac{1}{5} \,.\, (-10)$

$x = -2$

$y = \frac{1}{5} \,.\, (-1)^{2+2} \,.\, \begin{vmatrix} 1 & 2 \\ 2 & 1 \end{vmatrix}$

$y = \frac{1}{5} \,.\, (-3)$

$y = -\frac{3}{5}$

$z = \frac{1}{5} \,.\, (-1)^{3+2} \,.\, \begin{vmatrix} 1 & 2 \\ 1 & 3 \end{vmatrix}$

$z = -\frac{1}{5} \,.\, 1$

$z = -\frac{1}{5}$

$w = \frac{1}{5} \,.\, (-1)^{3+3} \,.\, \begin{vmatrix} 1 & 1 \\ 1 & -1 \end{vmatrix}$

$w = \frac{1}{5} \,.\, (-2)$

$w = -\frac{2}{5}$

a) $A = x - 3y - z + w$

$A = -2 - 3 \,.\, \left(-\frac{3}{5}\right) + \frac{1}{5} - \frac{2}{5}$

$A = -\frac{2}{5}$

b) $\det(2M) = 2^3 \,.\, \det M$

$\det(2M) = 8 \,.\, 5$

$\det(2M) = 40$

18) $B = \begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \\ a_{31} & a_{32} \end{bmatrix} \Rightarrow B = \begin{bmatrix} 0 & -1 \\ 1 & 0 \\ 2 & 1 \end{bmatrix}$

$A \,.\, B = \begin{bmatrix} 1+2 & -1+1 \\ 1+6 & -2+3 \end{bmatrix} \Rightarrow 2AB = \begin{bmatrix} 6 & 0 \\ 14 & 2 \end{bmatrix}$

$\Rightarrow \det(2AB) = 12$

19) $c - 1 = 0 \Rightarrow c = 1$

$b + c = 0 \Rightarrow b = -1$

$a - 3b = 0$

$a + 3 = 0 \Rightarrow a = -3$

20) $\begin{cases} x - 2 = 0 \Rightarrow x = 2 \\ y - 3 = 0 \Rightarrow y = 3 \end{cases} \quad \begin{cases} ax - y = a \\ 4x - by = a + 2 \end{cases}$

$\begin{cases} 2a - 3 = a \quad \Rightarrow a = 3 \\ 4 \,.\, 2 - 3b = 5 \Rightarrow 3b = 3 \end{cases}$

$b = 1$

21) Escalonamento

$$\left|\begin{array}{ccc|c} 2 & 1 & -4 & -1 \\ 4 & -2 & 8 & -2 \\ 8 & 1 & 4 & -10 \end{array}\right| \ell_1 \leftrightarrow \ell_2 \left|\begin{array}{ccc|c} 4 & -2 & 8 & -2 \\ 2 & 1 & -4 & -1 \\ 8 & 1 & 4 & -10 \end{array}\right| \rightarrow \ell_1 = \frac{\ell_1}{\ell_4}$$

$$\left|\begin{array}{ccc|c} 1 & -1/2 & 2 & -1/2 \\ 2 & 1 & -4 & -1 \\ 8 & 1 & 4 & -10 \end{array}\right| \xrightarrow[\ell_3 = \ell_3 - 8\ell_1]{\ell_2 = \ell_2 - 2\ell_1} \left|\begin{array}{ccc|c} 1 & -1/2 & 2 & -1/2 \\ 0 & 2 & -8 & 0 \\ 0 & 5 & -12 & -6 \end{array}\right| \xrightarrow[\frac{\ell_2}{2}]{}$$

$$\left|\begin{array}{ccc|c} 1 & -1/2 & 2 & -1/2 \\ 0 & 1 & -4 & 0 \\ 0 & 5 & -12 & -6 \end{array}\right| \ell_3 = \ell_3 - 5\ell_2 \left|\begin{array}{ccc|c} 1 & -1/2 & 2 & -1/2 \\ 0 & 1 & -4 & 0 \\ 0 & 0 & 8 & -6 \end{array}\right|$$

$\Rightarrow 8z = -6$

$z = -\frac{3}{4}$

$y - 4z = 0$

$y - 4 \,.\, \left(-\frac{3}{4}\right) = 0$

$y = -3$

$$x - \frac{y}{2} + 2z = -\frac{1}{2}$$

$$x + \frac{3}{2} - \frac{3}{2} = -\frac{1}{2}$$

$$x = -\frac{1}{2}$$

$$S = \left(-\frac{1}{2}, -3, -\frac{3}{4}\right)$$

22) Escalonamento

$$\left|\begin{array}{ccc:c} 2 & 3 & -1 & 3 \\ 3 & -2 & 1 & 2 \\ 1 & 1 & 0 & 1 \end{array}\right| \xrightarrow{\ell_1 \leftrightarrow \ell_3} \left|\begin{array}{ccc:c} 1 & 1 & 0 & 1 \\ 3 & -2 & 1 & 2 \\ 2 & 3 & -1 & 3 \end{array}\right| \xrightarrow[\ell_3 = \ell_3 - 2\ell_1]{\ell_2 = \ell_2 - 3\ell_1}$$

$$\left|\begin{array}{ccc:c} 1 & 1 & 0 & 1 \\ 0 & -5 & 1 & 1 \\ 0 & 1 & -1 & 1 \end{array}\right| \xrightarrow{\ell_3 \leftrightarrow \ell_2} \left|\begin{array}{ccc:c} 1 & 1 & 0 & 1 \\ 0 & 1 & -1 & 1 \\ 0 & -5 & 1 & 1 \end{array}\right| \xrightarrow[\ell_3 = \ell_3 + 5\ell_2]{}$$

$$\left|\begin{array}{ccc:c} 1 & 1 & 0 & 1 \\ 0 & 1 & -1 & 1 \\ 0 & 0 & 6 & 6 \end{array}\right| \rightarrow$$

$6z = 6$
$z = 1$
$y - z = 1$
$y - 1 = 1$
$y = 2$
$x + y = 1$
$x + 2 = 1$
$x = -1$

23) M: Matias; C: cachorro; G: gato

$$\begin{cases} M + C = 95 \\ M + G = 54 \\ C + G = 51 \end{cases}$$

$\Rightarrow \ell_1 = \ell_2$
$M + C + M + G = 54 + 95$
$2M + C + G = 149$
$2M + 51 = 149$

$$M = \frac{98}{2}$$

$M = 49$ kg
$M + G = 54$
$49 + G = 54$
$G = 5$ kg
$C + G = 51$
$C + 5 = 51$
$C = 46$ kg

24) $\begin{cases} 7x + y - 4z = 5a \\ x - 4y + az = b \end{cases}$ com $(x, y, z) = (2, -3, 1)$

$$\begin{cases} 7 \cdot 2 - 3 - 4 \cdot 1 = 5a \\ 2 - 4 \cdot (-3) + a \cdot 1 = b \end{cases} \Rightarrow$$

$$\begin{cases} 14 - 7 = 5a \\ 2 + 12 + a = b \end{cases} \Rightarrow$$

$$\begin{cases} 7 = 5a \\ 14 + a = b \end{cases}$$

$-14 - 3 - 4 = 5a$
$5a = 7$

$$a = \frac{7}{5}$$

$14 + a = b$

$$14 + \frac{7}{5} = b$$

$$\frac{70 + 7}{5} = b$$

$$\frac{77}{5} = b$$

Agora, calculando a + b fica:

$$a + b = \frac{77}{5} + \frac{7}{5} = \frac{84}{5}$$

$$a + b = \frac{84}{5}$$

25) $\begin{cases} 2x + 3y = 6 \\ 4x + 6y = 1 \end{cases}$

Não é possível, pois:
$2(2x + 3y) = 1$
$2 \cdot 6 = 1$
$12 = 1$ (absurdo)

26) C: coxinha; S: suco; Q: quibe

$$\begin{cases} C + S = 2 \\ C + Q = 2{,}20 \\ Q + S = 1{,}80 \end{cases}$$

$\Rightarrow \ell_1 + \ell_2$
$C + S + C + Q = 2 + 2{,}20$
$2C + S + Q = 4{,}20$
$2C + 1{,}80 = 4{,}20$
$2C = 2{,}40$
$C = 1{,}20$

27) P: pai; V: filho mais velho; N: filho mais novo

$$\begin{cases} V + N + 17 = P \\ 7 \cdot (N - 3) = P - 3 \\ 2 \cdot (V + 12) = P + 12 \end{cases}$$

$7N - 21 = P - 3$

$$N = \frac{P + 18}{7}$$

$2V + 24 = P + 12$

$$V = \frac{P - 12}{2}$$

$V + N + 17 = P$

$$\frac{P + 18}{7} + \frac{P - 12}{2} + 17 = P$$

$$\frac{2P + 36 + 7P - 84238}{\cancel{14}} = \frac{14P}{\cancel{14}}$$

190 = 14P – 9P
5P = 190
P = 38

28) $\begin{cases} 2x - 0 + z = 4 \\ 5x + 0 - 3z = k \\ 0 + z = -2 \end{cases}$

z = –2
2x – 2 = 4
x = 3
5x – 3z = k
5 . 3 – 3 . (–2) = k
k = 21

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

Com -y + z = 1, substituímos em 2x – y + z = 3:

$2x \underbrace{-y + z}_{1} = 3$

2x + 1 = 3
2x = 2
x = 1

$\begin{cases} x + y - 2z = -3 \\ 2x - y + z = 3 \end{cases} \Rightarrow$

$\begin{cases} 1 + y - 2z = -3 \\ 2 - y + z = 3 \end{cases} \Rightarrow$

$+\begin{cases} y - 2z = -4 \\ -y + z = 1 \end{cases}$

–z = –3
z = 3

y – 2z= –4
y – 2 . 3 = –4
y – 4 + 6
y = 2

Portanto, x = 1, y = 2 e z = 3

30) $(a - b)^2 = a^2 - 2ab + b^2$
$(a - b)^2 = a^2 + b^2 - 2ab$
$(a - b)^2 = 117 - 2 . 54$
$(a - b)^2 = 117 - 108$
$(a - b)^2 = 9$

31) $\begin{cases} 2x + y = 4 \\ 3x + 3z - 4x + 4y = 10 \\ 4x - 3z + 3 = 10 \end{cases}$

$\begin{cases} 2x + y = 4 \\ -x + 4y + 3z = 10 \\ 4x - 3z = 7 \end{cases} \Rightarrow y = 4 - 2x$

$\begin{cases} -x + 4y + 3z = 10 \\ 4x - 3z = 7 \end{cases} \Rightarrow \begin{cases} -x + 4(4 - 2x) + 3z = 10 \\ 4x - 3z = 7 \end{cases}$

$\Rightarrow +\begin{cases} -9x + 3z = -6 \\ 4x - 3z = 7 \end{cases}$

5x = 1

$x = \frac{1}{5}$

4x – 3z = 7

$4 . \frac{1}{5} - 3z = 7$

$-3z = \frac{31}{5}$

$z = -\frac{31}{15}$

$y = 4 - 2 . \frac{1}{5}$

$y = \frac{18}{5}$

2x – y – 3z

$\frac{2}{5} - \frac{18}{5} + \frac{31}{5} = \frac{15}{5} = 3$

32) $\frac{1}{a} = x$

$\frac{1}{b} = y$

$\frac{1}{c} = z$

$\begin{cases} x + y + z = 2 \\ 2x + 3y + z = -1 \\ x - y - z = 0 \end{cases}$

$\ell_1 + \ell_3 \Rightarrow +\begin{cases} x + y + z = 2 \\ x - y - z = 0 \end{cases}$

2x = 2
x = 1

$\begin{cases} x + y + z = 2 \\ 2x + 3y + z = -1 \end{cases} \Rightarrow \begin{cases} 1 + y + z = 2 \\ 2 + 3y + z = -1 \end{cases}$

$\Rightarrow -\begin{cases} y + z = 1 \\ 3y + z = -3 \end{cases}$

–2y = 4
y = –2
y + z = 1
–2 + z = 1
z = 3

$\frac{1}{a} = 1;\ a = 1$

$\frac{1}{b} = -2;\ b = -\frac{1}{2}$

$\frac{1}{c} = 3;\ c = \frac{1}{3}$

33) $\begin{cases} x - 3y = m \\ 2x + 3my = 4 \end{cases}$

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

$3m + 6 \neq 0$
$3m \neq -6$
$m \neq -2$
S.P.D.
(S.I.) $m = -2$

$\begin{cases} x - 3y = -2 \\ 2x - 6y = 4 \end{cases} \Rightarrow \begin{vmatrix} -2 & -3 \\ 4 & -6 \end{vmatrix} = 12 + 12 = 24$

34) C

$\begin{vmatrix} 1 & 1 \\ 1 & a^2 \end{vmatrix}$

$a^2 - 1 = 0$
$a^2 = 1$
$a = \pm 1$

Se $a = -1 \Rightarrow \begin{cases} x + y = 1 \\ x + y = -1 \end{cases} \Rightarrow \left|\begin{array}{cc:c} 1 & 1 & 1 \\ 1 & 1 & -1 \end{array}\right| \ \ell_2 = \ell_2 - \ell_1$

$\left|\begin{array}{cc:c} 1 & 1 & 1 \\ 0 & 0 & -2 \end{array}\right|$

absurdo → sistema impossível

35) $\begin{vmatrix} 1 & 1 \\ 1 & m^2 \end{vmatrix}$

$m^2 - 1 \neq 0$
$m^2 \neq 1$
$m \neq \pm 1$

Se $m = 1 \Rightarrow \begin{cases} x + y = 1 \\ x + y = 1 \end{cases} \Rightarrow$ S.P.I. $\ell_1 = \ell_2$ (infinitas soluções)

Se $m = -1 \Rightarrow \begin{cases} x + y = 1 \\ x + y = -1 \end{cases}$

$\left|\begin{array}{cc:c} 1 & 1 & 1 \\ 1 & 1 & -1 \end{array}\right| \xrightarrow{\ell_2 = \ell_2 - \ell_1} \left|\begin{array}{cc:c} 1 & 1 & 1 \\ 0 & 0 & -2 \end{array}\right|$

→ S.I. (sem solução)

Logo, $m \neq \pm 1$.

36) $\left|\begin{array}{ccc|cc} 1 & 2 & 2 & 1 & 2 \\ 3 & 6 & -4 & 3 & 6 \\ 2 & b & -6 & 2 & b \end{array}\right| = 0$

$-\cancel{36} - 16 + 6b - 24 + 4b + \cancel{36} = 0$
$10b = 40$
$b = 4$

$\Rightarrow \begin{cases} x + 2y + 2z = a \\ 3x + 6y - 4z = 4 \\ 2x + 4y - 6z = 1 \end{cases}$

$\left|\begin{array}{ccc:c} 1 & 2 & 2 & a \\ 3 & 6 & -4 & 4 \\ 2 & 4 & -6 & 1 \end{array}\right| \xrightarrow{\ell_2 = \ell_2 - \ell_1} \left|\begin{array}{ccc:c} 1 & 2 & 2 & a \\ 2 & 4 & -6 & 4 - a \\ 2 & 4 & -6 & 1 \end{array}\right| \xrightarrow{\ell_3 = \ell_3 - \ell_2}$

$\left|\begin{array}{ccc:c} 1 & 2 & 2 & a \\ 2 & 4 & -6 & 4 - a \\ 0 & 0 & 0 & 1 - 4 + a \end{array}\right| \rightarrow$

Para ser S.P.I.:
$1 - 4 + a = 0$
$a = 3$

37) a) $a = 1$

$\left|\begin{array}{ccc:c} 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 2 \\ 1 & 1 & 1 & -3 \end{array}\right| \xrightarrow[\ell_3 = \ell_3 - \ell_1]{\ell_2 = \ell_2 - \ell_1} \left|\begin{array}{ccc:c} 1 & 1 & 1 & 1 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & -4 \end{array}\right|$ S.I.

b) $a \neq 1$

38) D

$a = b = 0 \Rightarrow \begin{cases} x + 3y - 4z = 0 \\ 3x + y = 0 \\ 4x = 0 \end{cases}$

$\Rightarrow \left|\begin{array}{ccc|cc} 1 & 3 & -4 & 1 & 3 \\ 3 & 1 & 0 & 3 & 1 \\ 4 & 0 & 0 & 4 & 0 \end{array}\right| = 16$

S.P.D.: solução única, sistema homogêneo; solução trivial é única.

39) 11

40) Infinitas soluções – S.P.I. (sistema homogêneo)

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

$= 12 + 2 - 3m - 4m = 0$
$-7m = -14$
$m = 2$

41) 21

42) a) $\begin{vmatrix} 1 & 1 & m \\ 2 & 3 & -5 \\ 3 & -1 & 1 \end{vmatrix}\begin{matrix} 1 & 1 \\ 2 & 3 \\ 3 & -1 \end{matrix} \neq 0$

$3 - 15 - 2m - 9m - 5 - 2 \neq 0$
$-11m \neq 19$

$m \neq -\dfrac{19}{11}$

b) $\left|\begin{array}{ccc:c} 1 & 1 & 0 & 3 \\ 2 & 3 & -5 & -7 \\ 3 & -1 & 1 & 4 \end{array}\right| \xrightarrow[\ell_3 = \ell_3 - 3\ell_1]{\ell_2 = \ell_2 - 2\ell_1} \left|\begin{array}{ccc:c} 1 & 1 & 0 & 3 \\ 0 & 1 & -5 & -13 \\ 0 & -4 & 1 & -5 \end{array}\right| \ell_3 = \ell_3 + 4\ell_2$

$\left|\begin{array}{ccc:c} 1 & 1 & 0 & 3 \\ 0 & 1 & -5 & -13 \\ 0 & 0 & -19 & -57 \end{array}\right|$

$-19z = -57$
$z = 3$

43) B

$\left|\begin{array}{ccc:c} 1 & 1 & -1 & 3 \\ 1 & -1 & 1 & 1 \\ 1 & 3 & -3 & a \end{array}\right| \xrightarrow[\ell_2 = \ell_2 - \ell_1]{\ell_3 = \ell_3 - \ell_1} \left|\begin{array}{ccc:c} 1 & 1 & -1 & 3 \\ 0 & -2 & 2 & -2 \\ 0 & 2 & -2 & a-3 \end{array}\right| \xrightarrow{\ell_3 = \ell_3 + \ell_2}$

$\left|\begin{array}{ccc:c} 1 & 1 & -1 & 3 \\ 0 & -2 & 2 & -2 \\ 0 & 0 & 0 & a-5 \end{array}\right|$

$a - 5 = 0$
$a = 5$

44) $\begin{cases} 4a - 3b + 20 = -9 \\ -8a + 6b - 40 = 18 \\ a - 3b + 20 = 6 \end{cases}$

$-\begin{cases} 4a - 3b = -29 \\ a - 3b = -14 \end{cases}$

$3a = -15$
$a = -5$
$a - 3b = -14$
$-5 - 3b = -14$
$3b = 9$
$b = 3$
$a + 4b =$
$= -5 + 12 = 7$

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

$(a + 1) . (a - 1) - 8 = 0$
$a^2 - 1 - 8 = 0$
$a^2 = 9$
$a = \pm 3$

46) $\begin{vmatrix} 1 & -1 & 2 \\ 3 & 1 & -1 \\ 1 & 3 & n \end{vmatrix}\begin{matrix} 1 & -1 \\ 3 & 1 \\ 1 & 3 \end{matrix}$

$n + 1 + 18 - 2 + 3 + 3n = 0$
$4n = -20$
$n = -5$

$\left|\begin{array}{ccc:c} 1 & -1 & 2 & 1 \\ 3 & 1 & -1 & m \\ 1 & 3 & -5 & 2m-5 \end{array}\right| \xrightarrow[\ell_2 = \ell_2 - 3\ell_1]{\ell_3 = \ell_3 - \ell_1}$

$\left|\begin{array}{ccc:c} 1 & -1 & 2 & 1 \\ 0 & 4 & -7 & m-3 \\ 0 & 4 & -7 & 2m-6 \end{array}\right|$

$m - 3 = 2m - 6$
$m = 3$

47) 06