35 −648

36 −100

37 a) 15 b) 15 c) 40

38 Lembre que o determinante da matriz identidade vale 1.

39 a) −18 b) −21 c) −55

40 a) 3 b) 460 c) −87

41 Demonstração.

42 S = {2, −6}

43 S = {2, −1}

44 a) $x(x-y)^3$
b) $D = x^4 > 0,\ \forall x \in \mathbb{R}^*$

Testes de vestibulares

1 e	**9** a	**17** a	**25** e
2 c	**10** e	**18** c	**26** b
3 d	**11** b	**19** b	**27** b
4 c	**12** b	**20** c	**28** b
5 e	**13** d	**21** e	**29** a
6 d	**14** b	**22** c	
7 c	**15** b	**23** d	
8 d	**16** b	**24** e	

8 Sistemas lineares

Exercícios

1 sim

2 a) sim b) não c) não

3 a) não b) sim c) sim

4 m = 7

5 m = 2

6 Resposta pessoal.

8 20, 19, 18, 17 ou 16

9 sim

10 sim

11 não

12 a) (2, 1), (5, 4), (1, 0), (−5, −6), $\left(\frac{3}{2}, \frac{1}{2}\right)$, ...
b) SPI: possui infinitas soluções.

13 SI: as duas últimas equações são incompatíveis.

14 a) $A = \begin{pmatrix} \sqrt{3} & 4 \\ -\frac{1}{3} & 1 \end{pmatrix}$ e $B = \begin{pmatrix} \sqrt{3} & 4 & 2 \\ -\frac{1}{3} & 1 & 1 \end{pmatrix}$

b) $A = \begin{pmatrix} 4 & -1 & 1 \\ 1 & 2 & -1 \\ 1 & 0 & -1 \end{pmatrix}$ e

$B = \begin{pmatrix} 4 & -1 & 1 & 0 \\ 1 & 2 & -1 & 1 \\ 1 & 0 & -1 & 0 \end{pmatrix}$

c) $A = \begin{pmatrix} 3 & 2 \\ 1 & -1 \\ 4 & 1 \end{pmatrix}$ e $B = \begin{pmatrix} 3 & 2 & 5 \\ 1 & -1 & 1 \\ 4 & 1 & 6 \end{pmatrix}$

15 a) A = [−3 4 −5 1] e
B = [−3 4 −5 1 1]

b) $A = \begin{bmatrix} 2 & -1 & 3 \\ -1 & -1 & 10 \end{bmatrix}$ e

$B = \begin{bmatrix} 2 & -1 & 3 & 1 \\ -1 & -1 & 10 & 0 \end{bmatrix}$

16 a) $\begin{cases} 2x - y = 0 \\ 3x + y = 3 \end{cases}$

b) $\begin{cases} 4x + 2y + z = 8 \\ x - z = -3 \end{cases}$

c) $\begin{cases} -x + 3y + 5z = 1 \\ y - 2z = -2 \\ 4z = 3 \end{cases}$

17 a) SPD b) SI

18 a) sim b) não c) sim

19 a, c

20 a) S = {(1, −3)}; SPD

b) S = {(0, −1, 1)}; SPD

c) $S = \left\{\left(\frac{3}{2}, \alpha, \alpha\right); \alpha \in \mathbb{R}\right\}$; SPI

21 a) S = {(−8, 4, 1, 2)}; SPD

b) $S = \left\{\left(\frac{2+\alpha}{2}, \frac{1+\alpha}{2}, \alpha\right), \alpha \in \mathbb{R}\right\}$; SPI

22 a) S = {(α − β, β, α), α, β ∈ ℝ}

b) $S = \left\{\left(\frac{3-\beta-2\alpha}{2}, \beta, \alpha, \alpha\right), \alpha, \beta \in \mathbb{R}\right\}$

23 $S = \left\{\left(\frac{2+2\alpha}{3}, \frac{5\alpha-4}{3}, \alpha\right),\ \alpha \in \mathbb{R}\right\}$

24 a) $S = \left\{\left(\frac{4}{5}, \frac{-4}{5}\right)\right\}$

b) S = {(1, 1)}

25 a) S = ∅
b) S = {(3 + α, α), α ∈ ℝ}

26 34 motos e 45 carros

27 20

28 5

29 48 rapazes e 60 moças

30 a) S = {(1, −3, 2)}
b) S = {(1, 0, 2)}
c) S = ∅

31 a) $S = \left\{\left(\frac{-1+\alpha}{2}, \frac{5-3\alpha}{2}, \alpha\right), \alpha \in \mathbb{R}\right\}$

b) $S = \left\{\left(\frac{19}{30}, \frac{1}{6}, \frac{7}{30}\right)\right\}$

c) S = ∅

32 carro: 4 reais, ônibus: 6 reais e caminhão: 7 reais

33 a) $S = \left\{\left(\frac{-7\alpha+13}{11}, \frac{8+5\alpha}{11}, \alpha\right), \alpha \in \mathbb{R}\right\}$
b) S = ∅
c) S = {(−1, 2, −4)}

34 R$ 1 900,00

35 A: R$ 30,00; B: R$ 40,00; C: R$ 50,00

36 8,9 F

37 61

38 a) S = {(4, 1)}
b) S = ∅
c) S = {(4, 2)}

39 a) $S = \left\{\left(\frac{4-2\alpha}{5}, \frac{3+\alpha}{5}, \alpha\right), \alpha \in \mathbb{R}\right\}$

b) $S = \left\{\left(\frac{1-2\alpha}{3}, \frac{5+5\alpha}{3}, \alpha\right), \alpha \in \mathbb{R}\right\}$
c) S = ∅

40 a) SPI; S = {(α, α), α ∈ ℝ}
b) SPD; S = {(0, 0)}

41 a) SPD; S = {(0, 0, 0)}
b) SPI;
$S = \left\{\left(\frac{1}{3}\alpha, -\alpha, \alpha\right), \alpha \in \mathbb{R}\right\}$

42 a) m = 2

b) $S = \left\{\left(-\frac{11\alpha}{5}, \frac{9\alpha}{5}, \alpha\right), \alpha \in \mathbb{R}\right\}$

43 a) $S = \left\{\left(-\frac{7\alpha}{2}, \frac{-5\alpha}{2}, \alpha\right), \alpha \in \mathbb{R}\right\}$; SPI
b) S = {(0, 0)}; SPD

44 a) 1 e −2
b) S = {(α, α, α), α ∈ ℝ}

45 $m \neq -1$

46 a) $\begin{cases} x - 2y = 0 \\ (4+m)y = 0 \end{cases}$ b) m = −4

47 a) 1 e 3
b) Para o autovalor 1, temos que $X = \begin{bmatrix} x \\ -x \end{bmatrix}$, ∀x, e para o autovalor 3, temos que $X = \begin{bmatrix} 0 \\ y \end{bmatrix}$, ∀y.

48 a) $S = \{(4, 2)\}$ b) $S = \left\{\left(\frac{5}{8}, \frac{7}{16}\right)\right\}$

49 a) $S = \{(1, 3, 2)\}$

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

50 a) $S = \{(3, 1, 2)\}$ b) $S = \{(0, 0, 0)\}$

51 -5

52 $S = \{(-1, 2, 3, 1)\}$

53 Churrasco: R$ 1,50; quentão: R$ 0,40 e pastel: R$ 0,90.

54 Faca: R$ 5,50; colher: R$ 3,00 e garfo: R$ 4,00.

55 $S = \left\{\left(-3, \frac{-9}{14}, \frac{9}{17}\right)\right\}$

56 $S = \left\{\left(\frac{a - b}{a^2 + b^2}, \frac{b}{a^2 + b^2}\right)\right\}$

57 a) $D = 1, \forall\theta$

b) $\{(\cos(\theta - \beta), \text{sen}(\theta - \beta))\}$

58 16

59 $S = \left\{\left(\frac{a^2 + ab + b^2}{a + b}, \frac{-ab}{a + b}\right)\right\}$

60 20 g

61 a) $\begin{cases} x + y + z = 0,5 \\ 5x + 20y + 16z = 5,75 \\ y = \frac{1}{3} \cdot (x + z) \end{cases}$

em que x, y e z são as quantidades, em kg, de amendoim, castanha de caju e castanha-do-pará.

b) $x = 250$ g, $y = 125$ g e $z = 125$ g

62 $x = 1$, $y = 1$ e $z = -2$

63 a) $\begin{cases} m \neq 2 \rightarrow \text{SPD} \\ m = 2 \rightarrow \text{SI} \end{cases}$

b) $\begin{cases} m \neq 12 \rightarrow \text{SPD} \\ m = 12 \rightarrow \text{SPI} \end{cases}$

c) $\begin{cases} m \neq -2 \rightarrow \text{SPD} \\ m = -2 \rightarrow \text{SPI} \end{cases}$

64 a) $\begin{cases} m \neq 3 \rightarrow \text{SPD} \\ m = 3 \rightarrow \text{SI} \end{cases}$

b) $\begin{cases} m \neq -4 \text{ e } m \neq 4 \rightarrow \text{SPD} \\ m = 4 \rightarrow \text{SPI} \\ m = -4 \rightarrow \text{SI} \end{cases}$

c) $\begin{cases} m \neq -2 \rightarrow \text{SPD} \\ m = -2 \rightarrow \text{SPI} \end{cases}$

65 a) $\begin{cases} (m \neq -1 \text{ e } m \neq 1) \rightarrow \text{SPD} \\ m = 1 \rightarrow \text{SPI} \\ m = -1 \rightarrow \text{SI} \end{cases}$

b) $\begin{cases} (m \neq -2 \text{ e } m \neq 2) \rightarrow \text{SPD} \\ m = -2 \rightarrow \text{SI} \\ m = 2 \rightarrow \text{SPI} \end{cases}$

66 a) $\begin{cases} m \neq 3 \rightarrow \text{SPD} \\ m = 3 \rightarrow \text{SI} \end{cases}$

b) $\begin{cases} m \neq -3 \rightarrow \text{SPD} \\ m = -3 \rightarrow \text{SPI} \end{cases}$

67 a) $\begin{cases} m \neq 0 \text{ e } m \neq 1 \rightarrow \text{SPD} \\ m = 0 \rightarrow \text{SPI} \\ m = 1 \rightarrow \text{SI} \end{cases}$

b) $\begin{cases} m \neq -1 \text{ e } m \neq 2 \rightarrow \text{SPD} \\ m = -1 \text{ ou } m = 2 \rightarrow \text{SPI} \end{cases}$

68 a) $A = \begin{pmatrix} 1 & 2 & c \\ 0 & 1 & 1 \\ 3 & 2 & 2 \end{pmatrix}$; $\det A = 6 - 3c$

b) $c \neq 2$

69 $a = 2$

70 $a = 3$ e $b = 4$

71 $m \neq -\frac{5}{2}$

72 $m = -1$

73 $p + q \neq 0$

74 $m = \frac{1}{3}$

75 $m \neq -\frac{1}{3}$ e $m \neq 1$

76 a) $S = \left\{\left(\frac{13}{2}, \frac{1}{2}, \frac{1}{2}\right)\right\}$

b) $m = -9$ e $n = \frac{1}{3}$

77 $\begin{cases} a \neq -2 \rightarrow \text{SPD} \\ (a = -2 \text{ e } b = 6) \rightarrow \text{SPI} \\ (a = -2 \text{ e } b \neq 6) \rightarrow \text{SI} \end{cases}$

78 $\begin{cases} a \neq -2 \rightarrow \text{SPD} \\ (a = -2 \text{ e } b = 2) \rightarrow \text{SPI} \\ (a = -2 \text{ e } b \neq 2) \rightarrow \text{SI} \end{cases}$

79 $a = 2$

80 $\begin{cases} a \neq -4 \rightarrow \text{SPD} \\ (a = -4 \text{ e } b = -2) \rightarrow \text{SPI} \\ (a = -4 \text{ e } b \neq -2) \rightarrow \text{SI} \end{cases}$

81 a) $m \neq -3$

b) $S = \{(3\alpha, -\alpha, \alpha), \alpha \in \mathbb{R}\}$

Testes de vestibulares

1 c	**9** b	**17** e	**23** c
2 c	**10** a	**18** e	**24** b
3 b	**11** b	**19** a) F	**25** a
4 e	**12** c	b) V	**26** a
5 e	**13** e	c) F	**27** c
6 d	**14** e	d) F	**28** c
7 a	**15** e	**20** a	**29** b
8 c	**16** c	**21** d	**30** b
		22 a	

9 Áreas de figuras planas

Exercícios

1 a) 48 cm² b) 40 cm²

2 17 cm²

3 1 728

4 $\frac{24}{25}$

5 88,40 m²

6 a) $A_Q = 576$ m², $A_R = 432$ m²

b) $\frac{12}{13}$

7 a) $A_I = 400$ m², $A_{II} = 2\,250$ m², $A_{III} = 2\,550$ m²

b) aproximadamente 51%

c) R$ 66 300,00

8 126 cm²

9 a) 2,05 m b) 2,04 m²

10 1 m

11 200 cm²

12 738

13 10

14 a) 15 m²

b) 60 m²

c) $16\sqrt{3}$ m²

d) 48 m²

e) $9\sqrt{5}$ m²

f) $18\sqrt{3}$ m²

g) $32\sqrt{3}$ m²

h) 24 m²

i) 40 m²

15 $\frac{25\sqrt{3}}{36}$ m²

16 $\left(8 + 4\sqrt{2}\right)$ cm

17 $\frac{11\sqrt{3}}{4}$ cm

18 3,375 m²

19 $\frac{3\sqrt{2}}{5}$ m

20 a) 24 cm²

b) 96 cm²

c) $32\sqrt{3}$ cm²

d) 135 cm²

e) 864 cm²

21 $1350\sqrt{3}$ km²

22 $6\sqrt{2}$ cm

23 92 centavos

24 32 cm²

25 I) 80 II) 25