



ÁLGEBRA LINEAL

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OCTAVA EDICIÓN

**Mc
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Respuesta a los problemas impares

Capítulo 4

4.1 Vectores en el plano

1. $|\mathbf{v}| = \sqrt{32}, \theta = \frac{\pi}{4}$.

11. $|\mathbf{v}| = \frac{\sqrt{10}}{3}, \theta = \pi - \arctan\left(\frac{1}{3}\right)$.

19. $|\mathbf{v}| = \pi, \theta = 0$.

21. a) $2\mathbf{i} + 5\mathbf{j}$; b) $-6\mathbf{i} - 4\mathbf{j}$; c) $6\mathbf{i} + 4\mathbf{j}$; d) $16\mathbf{i} + 13\mathbf{j}$; e) $-16\mathbf{i} - 13\mathbf{j}$;
f) $6\mathbf{i} + 11\mathbf{j}$.

25. $|\mathbf{v}| = 1$.

27. $\left(\frac{\sqrt{40}}{20} \quad \frac{3\sqrt{40}}{20} \right)$.

29. $\left(\frac{6\sqrt{37}}{37} \quad -\frac{\sqrt{37}}{37} \right)$.

31. $\left(\frac{2\sqrt{325}}{65} \quad \frac{3\sqrt{325}}{65} \right)$.

37. $\left(\frac{4}{5} \quad -\frac{3}{5} \right)$.

43. $\left(\frac{8\sqrt{73}}{73} \quad \frac{3\sqrt{73}}{73} \right)$.

49. $(-1 \quad 0)$.

53. $\left(\frac{\sqrt{2}}{4} \quad -\frac{\sqrt{2}}{4} \right)$.

55. $(0 \quad -\epsilon)$.

4.2 El producto escalar y las proyecciones en \mathbb{R}^2

1. $\mathbf{u} \cdot \mathbf{v} = -8, \cos \phi = -\frac{2\sqrt{2}\sqrt{34}}{17}$.

5. $\mathbf{u} \cdot \mathbf{v} = 0, \cos \phi = 0$.

9. $\mathbf{u} \cdot \mathbf{v} = -12, \cos \phi = -\frac{\sqrt{18}}{6}$.

17. No son paralelos ni ortogonales.

29. $\left(\frac{64}{25} \quad \frac{48}{25} \right)$.

33. $\left(\frac{9\sqrt{5}}{47} \quad \frac{10\sqrt{3}}{47} \right)$.

35. $\left(-\frac{4}{17} \quad \frac{1}{17} \right)$.

41. $\text{proy}_{\vec{PQ}} \vec{RS} = \left(-\frac{18}{37} \quad -\frac{3}{37} \right)$,
 $\text{proy}_{\vec{RS}} \vec{PQ} = \left(\frac{3}{10} \quad -\frac{9}{10} \right)$.

47. $\cos A = \frac{94\sqrt{125}\sqrt{657}}{27375}, \cos B = \frac{157\sqrt{125}\sqrt{218}}{27250}$,
 $\cos C = \frac{125\sqrt{218}\sqrt{657}}{47742}$.

51. $d = \frac{\sqrt{5}}{5}$.

4.3 Vectores en el espacio

5. 2.

7. $|\mathbf{v}| = \sqrt{13}$,
 $(\cos \alpha \quad \cos \beta \quad \cos \delta) = \left(\frac{3\sqrt{13}}{13} \quad -\frac{2\sqrt{13}}{13} \quad 0 \right)$.

11. $|\mathbf{v}| = \sqrt{14}$,
 $(\cos \alpha, \cos \beta, \cos \delta) = \left(\frac{\sqrt{14}}{7} \quad -\frac{\sqrt{14}}{14} \quad -\frac{3\sqrt{14}}{14} \right)$.

15. $|\mathbf{v}| = \sqrt{17}$,
 $(\cos \alpha \quad \cos \beta \quad \cos \delta) = \left(0 \quad \frac{\sqrt{17}}{17} \quad -\frac{4\sqrt{17}}{17} \right)$.

25. $|\mathbf{v}| = \sqrt{69300}$,
 $(\cos \alpha, \cos \beta, \cos \delta) = \left(\frac{\sqrt{69300}}{462}, -\frac{2\sqrt{69300}}{1155}, -\frac{\sqrt{69300}}{385} \right)$.

31. $\left(-\frac{\sqrt{185}}{37} \quad -\frac{4\sqrt{185}}{185} \quad \frac{12\sqrt{185}}{185} \right)$

37. $(18 \quad -14 \quad -14)$.

39. $(3 \quad -20 \quad 9)$.

41. 31.

43. -24.

45. $\sqrt{86}$.

47. $\pi - \arccos\left(\frac{2\sqrt{26}}{13}\right)$.

49. $\left(-\frac{36}{13} \quad \frac{48}{13} \quad \frac{12}{13} \right)$.

51. $-\frac{11}{5}$.

4.4 El producto cruz de dos vectores

5. $(-16 \quad 54 \quad -30)$.

11. $(6 \quad 22 \quad -24)$.

21. $(-60 \quad 53 \quad -17)$.

27. $(-3 \quad 13 \quad 4)$.

29. $(3 \quad -11 \quad -5), (-3 \quad 11 \quad 5)$.

47. 36.

4.5 Rectas y planos en el espacio

5. $(x \ y \ z) = (16t - 7 \ 14t - 9 \ t + 6)$; $x=16t - 7$,
 $y=14t - 9$, $z=t + 6$; $\frac{x+7}{16} = \frac{y+9}{14} = z - 6$.

9. $(x \ y \ z) = (2t + 2 \ -t + 2 \ -t + 1)$; $x=2t + 2$,
 $y=-t + 2$, $z=-t + 1$; $\frac{x-2}{2} = \frac{y-2}{-1} = \frac{z-1}{-1}$.

17. $(x \ y \ z) = (at - 9 \ bt + 8 \ 0)$; $x=at - 9$, $y=bt + 8$,
 $z=0$; $\frac{x+9}{a} = \frac{y-8}{b}$, $z=0$, si $a \neq 0$, $b \neq 0$.

19. $(x \ y \ z) = (2t + 4 \ 3t + 1 \ -7t - 6)$; $x=2t + 4$,
 $y=3t + 1$, $z=-7t - 6$; $\frac{x-4}{2} = \frac{y-1}{3} = \frac{z+6}{-7}$.

31. $x = \frac{7}{22}kt$, $y = 1 - \frac{17}{11}kt$, $z = kt$ para $k \in \mathbb{R}$.

43. $2x - 5y - 5z = -23$.

51. $18x + 3y - 45z = 60$.

57. Ninguno de los anteriores.

63. $\{(x, y, z) \in \mathbb{R}^3 : x = -\frac{8}{21} - k, y=k, z=\frac{9}{14}, k \in \mathbb{R}\}$.

65. $\{(x, y, z) \in \mathbb{R}^3 : x = -\frac{41}{6} - \frac{3}{2}k, y = -\frac{7}{3}, z=k, k \in \mathbb{R}\}$.

69. $d = \frac{13\sqrt{45}}{45}$.

71. $d = 0$.

79. No son coplanares.

81. No son coplanares.

Ejercicios de repaso

3. $|\mathbf{v}| = \sqrt{37}$, $\theta = \arctan(6) - \pi$.

13. $(1 \ -8)$.

15. $(9 \ -3)$.

17. $(5 \ -11)$.

19. $(10 \ 30)$.

21. $(2 \ 16)$.

31. $(\frac{3\sqrt{3}\sqrt{35}}{35} \ \frac{2\sqrt{2}\sqrt{35}}{35})$.

33. $(\frac{\sqrt{2}\sqrt{30}}{10} \ -\frac{\sqrt{3}\sqrt{30}}{15})$

35. $(\frac{5\sqrt{12}\sqrt{79}}{158} \ \frac{\sqrt{3}\sqrt{12}\sqrt{79}}{237})$.

39. $(0 \ \frac{3}{2})$.

43. $\mathbf{u} \cdot \mathbf{v} = 3$, $\cos \theta = \frac{1}{2}$.

49. Son ortogonales.

57. $(-\frac{2}{5} \ -\frac{4}{5})$.

61. $(0 \ 7)$.

67. $d = \sqrt{38}$.

73. $(-\frac{\sqrt{59}}{59} \ \frac{7\sqrt{59}}{59} \ -\frac{3\sqrt{59}}{59})$.

75. $(-16 \ 17 \ -10)$.

77. $(-\frac{16}{15} \ -\frac{16}{15} \ -\frac{16}{15})$.

79. $(31 \ -3 \ 23)$

81. 7.

83. $\pi - \arccos(\frac{4\sqrt{3}\sqrt{90}}{135})$.

87. $(-4 \ 16 \ 5)$.

91. $(x \ y \ z) = (-2t + 1 \ 7t - 7 \ 7)$; $x = -2t + 1$,
 $y = 7t - 9$, $z = 7$; $\frac{x-1}{-2} = \frac{y}{7}$, $z = 7$

99. $3y - z = 7$.

103. $73x + 117y - 43z = -328$.

107. Ambos planos son concurrente,
 $\{(x, y, z) \in \mathbb{R}^3 : x = \frac{1}{3}k_1 - \frac{2}{3}k_2 - \frac{7}{3}, y = k_1, z = k_2\}$
 con $k_1 \in \mathbb{R}, k_2 \in \mathbb{R}$.

109. $d = 0$.