
1)

$$P1 \rightarrow [1, \sqrt{3}], \quad P2 \rightarrow [2, -2\sqrt{3}], \quad P3 \rightarrow [-\frac{9}{2}, \frac{9\sqrt{3}}{2}], \quad P4 \rightarrow [1, 0].$$

2)

$$P1 \rightarrow [1, \frac{3\pi}{2}], \quad P2 \rightarrow [1, \frac{\pi}{2}], \quad P3 \rightarrow [1, \pi], \quad P4 \rightarrow [\sqrt{2}, \frac{\pi}{4}].$$

3)

$$(a) \rightarrow r = 4, \quad (b) \rightarrow \sin(\theta) = \cos(\theta), \quad (c) \rightarrow r \cos(\theta) = 3, \quad (d) \rightarrow r^2 = 2r \cos(\theta).$$

4)

$$(a) \rightarrow x^2 + y^2 = 2x, \quad (b) \rightarrow x^2 + y^2 = a^2, \quad (c) \rightarrow y = x, x > 0, \quad (d) \rightarrow y^2 = 4 - 4x.$$

5) O primeiro gráfico é a reta horizontal $y = 2$ e o segundo a circunferência de raio 1 centrada no ponto $(-2, 0)$, com equação $(x + 2)^2 + y^2 = 1$. Assim, a distância é 1.

6) Distância = $\sqrt{2}$.

7)

$$(a) \rightarrow [2, 2\sqrt{3}, -2], \quad (b) \rightarrow [0, -2, 1], \quad (c) \rightarrow [-1, 1, 2], \quad (d) \rightarrow [\cos(1), \sin(1), 2].$$

8)

$$(a) \rightarrow [2, \frac{\pi}{3}, -1], \quad (b) \rightarrow [3\sqrt{2}, \frac{7\pi}{4}, 2], \quad (c) \rightarrow [2, \frac{3\pi}{4}, 1], \quad (d) \rightarrow [2\sqrt{2}, \frac{\pi}{4}, 2].$$

9)

$$(a) \rightarrow r^2 + z^2 = 1, \quad (b) \rightarrow 2r^2 - z^2 = 4, \quad (c) \rightarrow z = r \cos(2\theta), \quad (d) \rightarrow 2r \cos(\theta) - r \sin(\theta) + z = 1.$$

10) $6 \leq r \leq 7, 0 \leq z \leq 20$. As coordenadas tem o eixo z como eixo central da casca, e o piso da casca está no nível $z = 0$.

11) (a) distância = $\sqrt{2}$, (b) distância = $\sqrt{3}$.

12)

$$(a) \rightarrow \left[\frac{3}{2}, \frac{3\sqrt{3}}{2}, 3\sqrt{3} \right], \quad (b) \rightarrow \left[0, \frac{3}{\sqrt{2}}, -\frac{3}{\sqrt{2}} \right], \quad (c) \rightarrow [0, 2, 0], \quad (d) \rightarrow [\sqrt{2}\sqrt{3}, -\sqrt{2}\sqrt{3}, 2].$$

13)

$$(a) \rightarrow \left[\sqrt{2}, 0, \frac{3\pi}{4} \right], \quad (b) \rightarrow \left[2\sqrt{2}, \frac{\pi}{4}, \frac{\pi}{3} \right], \quad (c) \rightarrow \left[2, 0, \frac{\pi}{6} \right], \quad (d) \rightarrow \left[4, \frac{11\pi}{6}, \frac{\pi}{6} \right].$$

14)

$$(a) \rightarrow \rho^2 = 9, \quad (b) \rho^2 (2\cos(\theta)^2 \sin(\phi)^2 - 1) = 1 \rightarrow, \quad (c) \rightarrow \phi = \pi/4, \quad (d) \rightarrow \rho \cos(\phi) = \rho^2 \sin(\phi)$$

15)

$$(a) \rightarrow 3, \quad (b) \rightarrow 3\sqrt{2}, \quad (c) \rightarrow 3\sqrt{2}$$