

Cálculo II

$$a = r = 3 \cos \theta$$

$$y = r \sin \theta$$

$$y = 3 \cos \theta \sin \theta$$

$$x = r \cos \theta$$

$$x = 3 \cos^2 \theta$$

Tangentes Horizontais

$$\frac{dy}{d\theta} = 3 (-\sin^2 \theta + \cos^2 \theta)$$

$$\frac{dy}{d\theta} = 3 \cos 2\theta$$

$$3 \cos 2\theta = 0 \quad :3$$

$$\cos 2\theta = 0 \quad \rightarrow \quad \left(\frac{\pi}{2} \text{ e } \frac{3\pi}{2} \right)$$

$$2\theta_1 = \frac{\pi}{2}$$

$$2\theta_2 = \frac{3\pi}{2}$$

$$\theta_1 = \frac{\pi}{4}$$

$$\theta_2 = \frac{3\pi}{4}$$

Tangentes Verticais

$$\frac{dx}{d\theta} = 6 \cos \theta (-\sin \theta) = -6 \cos \theta \sin \theta$$

Coca-Cola

$$\frac{dx}{d\theta} = -3 \sin 2\theta$$

$$-3 \sin 2\theta = 0 \quad \Rightarrow$$

$$\sin 2\theta = 0 \rightarrow (0 \text{ e } \pi)$$

$$2\theta_3 = 0$$

$$2\theta_4 = \pi$$

$$\theta_3 = 0$$

$$\theta_4 = \frac{\pi}{2}$$

Calcular r de cada θ

$$r_1 = 3 \cos \theta_1 = 3 \cos \left(\frac{\pi}{4} \right) = \boxed{\frac{3\sqrt{2}}{2}}$$

$$r_2 = 3 \cos \theta_2 = 3 \cos \left(\frac{3\pi}{4} \right) = \boxed{\frac{-3\sqrt{2}}{2}}$$

$$r_3 = 3 \cos \theta_3 = 3 \cdot \cos 0 = \boxed{3}$$

$$r_4 = 3 \cos \theta_4 = 3 \cdot \cos \left(\frac{\pi}{2} \right) = \boxed{0}$$

Refresking

$$\text{Horizontais} \rightarrow \left(\frac{3\sqrt{2}}{2}, \frac{\pi}{4} \right) \text{ e } \left(-\frac{3\sqrt{2}}{2}, \frac{3\pi}{4} \right)$$

$$\text{VERTICAIS} \rightarrow (3, 0) \text{ e } \left(0, \frac{\pi}{2} \right)$$

$$b = 1 - \sin \theta$$

$$y = r \sin \theta$$

$$y = \sin \theta - \sin^2 \theta$$

$$x = r \cos \theta$$

$$x = \cos \theta - \sin \theta \cos \theta$$

Tangentes Horizontais

$$\frac{dy}{d\theta} = \cos \theta - 2 \sin \theta \cos \theta$$

$$\cos \theta - 2 \sin \theta \cos \theta = 0$$

$$\cancel{\cos \theta} = 2 \sin \theta \cancel{\cos \theta}$$

$$2 \sin \theta = 1$$

$$\sin \theta = \frac{1}{2}$$

$$\rightarrow \left(\frac{\pi}{6} \text{ e } \frac{5\pi}{6} \right)$$

$$\theta_1 = \frac{\pi}{6}$$

$$\theta_2 = \frac{5\pi}{6}$$

Coca-Cola

Tangentes Verificais

$$\frac{dy}{d\theta} = -\sin \theta - \cos^2 \theta + \sin^2 \theta$$

$$-\sin \theta - \cos^2 \theta + \sin^2 \theta = 0$$

$$-\sin \theta - (1 - \sin^2 \theta) + \sin^2 \theta = 0$$

$$-\sin \theta - 1 + \sin^2 \theta + \sin^2 \theta = 0$$

$$-\sin \theta - 1 + 2\sin^2 \theta = 0$$

$$\sin \theta = p$$

$$2p^2 - p - 1 = 0$$

$$s = 1/2$$

$$p' = 1$$

$$p = -1/2$$

$$p'' = -1/2$$

$$\left. \begin{array}{l} p' = 1 \\ p'' = -1/2 \end{array} \right\} (1, \pi/2)$$

$$\theta_3 = \frac{\pi}{2}$$

$$\theta_4 = \frac{7\pi}{6}$$

$$\theta_5 = \frac{11\pi}{6}$$

Refreshing

Calcular r para cada θ

$$r_1 = 1 - \sin \frac{\pi}{6} = 1 - \frac{1}{2} = \boxed{\frac{1}{2}}$$

$$r_2 = 1 - \sin \frac{5\pi}{6} = 1 - \frac{1}{2} = \boxed{\frac{1}{2}}$$

$$r_3 = 1 - \sin \frac{\pi}{2} = 1 - 1 = \boxed{0}$$

$$r_4 = 1 - \sin \frac{7\pi}{6} = 1 - \left(-\frac{1}{2}\right) = \boxed{\frac{3}{2}}$$

$$r_5 = 1 - \sin \frac{11\pi}{6} = 1 - \left(-\frac{1}{2}\right) = \boxed{\frac{3}{2}}$$

Horizontais $\rightarrow \left(\frac{1}{2}, \frac{\pi}{6}\right)$ e $\left(\frac{1}{2}, \frac{5\pi}{6}\right)$

Verticais $\rightarrow \left(0, \frac{\pi}{2}\right)$, $\left(\frac{3}{2}, \frac{7\pi}{6}\right)$ e $\left(\frac{3}{2}, \frac{11\pi}{6}\right)$