

I

$$a) \{-4, 0, 4\}$$

$$b) \{-3, 2, 10\}$$

$$c) \mathbb{R} - \{-4, -3, 0, 2, 4\}$$

$$\textcircled{II} \textcircled{a} \lim_{x \rightarrow \frac{3\pi}{4}} \left[\frac{1 + \tan(x)}{\sin(x) + \cos(x)} \right] = \frac{0}{0} \text{ indeterminado}$$

$$\lim_{x \rightarrow \frac{3\pi}{4}} \left[\frac{1 + \tan(x)}{\sin(x) + \cos(x)} \right] \quad \lim_{x \rightarrow \frac{3\pi}{4}} \frac{\cancel{\cos(x)} + \cancel{\sin(x)}}{\cancel{\sin(x)} + \cancel{\cos(x)}}$$

$$\lim_{x \rightarrow \frac{3\pi}{4}} \frac{1}{\cos(x)} = \frac{1}{\cos\left(\frac{3\pi}{4}\right)} = \frac{1}{\frac{-\sqrt{2}}{2}} = \frac{-2}{\sqrt{2}}$$

$$\textcircled{b} \lim_{x \rightarrow 0} \frac{4x + \sin(3x)}{x \cdot \sec(x)} = \frac{0}{0} \text{ indet}$$

$$\lim_{x \rightarrow 0} \left(\frac{4x}{3x} + \frac{\sin(3x)}{3x} \right) \quad \lim_{x \rightarrow 0} \frac{4}{3} + \frac{1}{\frac{x}{\cos(x) \cdot 3x}}$$

$$\frac{7}{3} = \frac{7}{3} \cdot \frac{3 \cdot 1}{1} = 7$$

$$\textcircled{c} \lim_{x \rightarrow \infty} \left[\frac{x^2 - 9}{x(x^2 + 1)} \right] = \frac{0}{0} \text{ indet}$$

$$\lim_{x \rightarrow \infty} \frac{x^2 - 9}{x^3 + x} \cdot \frac{x^3}{x^3} = \frac{1 - \frac{9}{x^3}}{1 + \frac{1}{x^2}} = \frac{0}{1} = 0$$

$$\text{III } a) y = \ln(x) - \cos(x) + \frac{e^x}{4} - \ln(4)$$

$$y' = \frac{1}{x} - \cos(x) + \left(\frac{e^x \cdot 4 - e^x \cdot 0}{16} \right) - 0$$

$$y' = \frac{1}{x} - \cos(x) + \frac{e^x}{4}$$

$$b) y = (x^4 + x)(\sqrt{x} + \cos(x))$$

$$y' = ((x^4 + x)' \cdot \sqrt{x} + \cos(x)) + (x^4 + x) \cdot \sqrt{x} + \cos(x))'$$

$$y' = (4x^3 + 1) \cdot (\sqrt{x} + \cos(x)) + (x^4 + x) \cdot \frac{1}{2\sqrt{x}} - \cos(x)$$

$$c) y = \frac{\tan(x)}{e^x} = \frac{(\tan(x))' \cdot e^x - \tan(x) \cdot (e^x)'}{(e^x)^2}$$

$$\frac{(\sec^2(x) \cdot e^x) - (\tan(x) \cdot e^x)}{(e^x)^2}$$

IV a) $y = \sqrt{x^2 + \ln(x)^3}$

$$\left(\frac{-1}{2\sqrt{x^2 + \ln(x)^3}} \right) \cdot (2x) + \left(\frac{1}{2\sqrt{\ln(x)^3}} \right) \cdot -\ln(x)^3 \cdot 3x^2$$

b) $y = (x+1)^4 \cdot \ln^3(2 + \ln(x))$

$$((x+1)^4)' \cdot \ln^3(2 + \ln(x)) + (x+1)^4 \cdot (\ln^3(2 + \ln(x)))'$$

$$((4(x+1)^3 \cdot 1) \cdot \ln^3(2 + \ln(x)) + (x+1)^4 \cdot (3\ln^2(2 + \ln(x)) \cdot$$

$$\ln(2 + \ln(x)) \cdot (0 + \frac{1}{x}))$$

c) $y = \frac{e^{x^5}}{x^5 + x^3}$

$$y' = \frac{(e^{x^5})' \cdot (x^5 + x^3) - (e^{x^5}) \cdot (x^5 + x^3)'}{(x^5 + x^3)^2}$$

$$y' = \frac{(e^{x^5} \cdot 5x^4)(x^5 + x^3) - (e^{x^5}) \cdot (5x^4 + 3x^2)}{(x^5 + x^3)^2}$$