



EXERCÍCIOS

LISTA 1.1) $f(x) = e^{x^2-3x}$

Seja: $D(f) = \mathbb{R}$

$$\therefore f'(x) = e^{x^2-3x} \cdot \ln e (3x^2-3)$$

$$\therefore f'(x) = e^{x^2-3x} \cdot (3x^2-3)$$

$$\therefore D(f') = \mathbb{R}$$

$$\therefore f'(x) = 0$$

$$\therefore e^{x^2-3x} \cdot (3x^2-3) = 0$$

$$\begin{cases} e^{x^2-3x} = 0 \Rightarrow \nexists x \in \mathbb{R} \\ 3x^2-3 = 0 \Rightarrow 3x^2=3 \Rightarrow x^2=1 \Rightarrow x=\pm\sqrt{1}=\pm 1 \end{cases}$$

$$\therefore f'(x) \begin{array}{c} + + + - - \\ \hline \end{array} \xrightarrow{1} D(f')$$

$$f'(0)$$

ENTRE O PA: ATE 12/12

VALIA 19,12

PRESENTA

2. (SABADO)

2. (SABADO)

12



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EXERCÍCIOS

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$$\therefore f'(x) \quad + + + \quad - \quad - \quad - \quad + + + \rightarrow D(f')$$

$\therefore f(x)$ tem máximo relativo em $x = -1$

$\therefore f(x)$ tem mínimo relativo em $x = 1$

x	$f(x)$
-1	e^2
1	e^{-2}

EXERCÍCIOS

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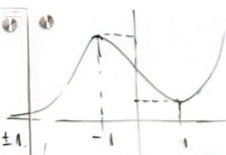
$$\therefore f'(x) = 0 \Rightarrow x = -1, 1$$

$$\therefore f'(x) \begin{matrix} + & + & + & - & - & - & + & + & + & + \end{matrix} \rightarrow D(f')$$

$\therefore f(x)$ tem máximo relativo em $x = -1$.

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x	f(x)
-1	e^2
1	e^{-2}



12/12

LISTA 1.5) $f(x) = \frac{1-x^3}{x^2}$

sol: $D(f) = \mathbb{R}^*$

$$f'(x) = \frac{(-3x^2) \cdot x^2 - (1-x^3) \cdot 2x}{(x^2)^2}$$

$$f'(x) = \frac{-3x^4 - 2x + 2x^4}{x^4}$$

$$f'(x) = \frac{-x^4 - 2x}{x^4} = \frac{\cancel{x} \cdot (-x^3 - 2)}{\cancel{x^4}}$$

$$f'(x) = \frac{-x^3 - 2}{x^3}$$

$\therefore D(f') = \mathbb{R}^*$

$$\therefore f'(x) = 0 \Rightarrow \frac{-x^3 - 2}{x^3} = 0$$

$$\therefore -x^3 - 2 = 0$$

$$\therefore x^3 = -2$$

$$\therefore \boxed{x = \sqrt[3]{-2} = -\sqrt[3]{2}}$$

$$\therefore f'(x) \text{ --- } -\sqrt[3]{2} \text{ --- } 0 \text{ --- } \rightarrow D(f')$$

Exercícios

$$f(x) = x^3 - 3x$$

$$f'(x) = 3x^2 - 3$$

$$\therefore x^3 - 3x = 0$$

$$\begin{cases} x^3 - 3x = 0 \Rightarrow \forall x \in \mathbb{R} \\ 3x^2 - 3 = 0 \Rightarrow 3x^2 = 3 \Rightarrow x^2 = 1 \Rightarrow x = \pm\sqrt{1} = \pm 1 \end{cases}$$

$$\therefore f'(x) \text{ } ++ + - - - + + + \rightarrow D(f')$$

$\therefore f(x)$ tem máximo relativo em $x = -1$.

$\therefore f(x)$ tem mínimo relativo em $x = 1$.

x	f(x)
-1	2
1	-2

$$\text{LISTA 1.5) } f(x) = \frac{-x^3}{x^2}$$

$$\text{Sol: } D(f) = \mathbb{R}^*$$

$$f'(x) = \frac{(-3x^2) \cdot x^2 - (-x^3) \cdot 2x}{(x^2)^2}$$

$$f'(x) = \frac{-3x^4 - 2x^4}{x^4}$$

$$f'(x) = \frac{-x^4 - 2x}{x^4} = \frac{-x^4 - 2x}{x^4}$$

$$f'(x) = \frac{-x^3 - 2}{x^3}$$

$$\therefore D(f') = \mathbb{R}^*$$

$$\therefore f'(x) = 0 \Rightarrow \frac{-x^3 - 2}{x^3} = 0$$

$$\therefore -x^3 - 2 = 0$$

$$\therefore x^3 = -2$$

$$\therefore x = \sqrt[3]{-2} = -\sqrt[3]{2}$$

$$\therefore f'(x) \text{ } - - - + + + 0 - - - \rightarrow D(f')$$

$\therefore f(x)$ tem mínimo relativo em $x = -\sqrt[3]{2}$.



LISTA 1.5) $f(x) = \frac{1-x^3}{x^2}$

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$\therefore f'(x) = 0 \Rightarrow \frac{-x^3 - 2}{x^3} = 0$

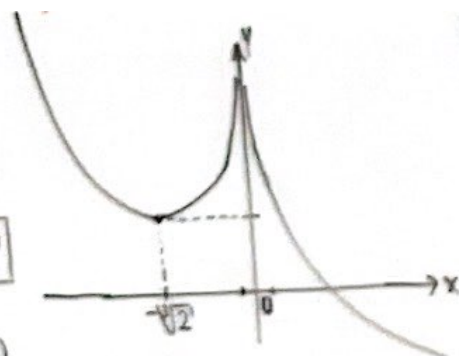
$$\therefore -x^3 - 2 = 0$$

$$\therefore x^3 = -2$$

$$\therefore x = \sqrt[3]{-2} = -\sqrt[3]{2}$$

$$\therefore f'(x) = \frac{-\sqrt[3]{2}}{1} + \frac{0}{0} \rightarrow D(f')$$

$\therefore f(x)$ tem mínimo relativo em $x = -\sqrt[3]{2}$





EXERCÍCIOS

LISTA 1.1 $f(x) = e^{x^2-3x}$

Sol.: $D(f) = \mathbb{R}$

$\therefore f'(x) = e^{x^2-3x} \cdot \ln e \cdot (2x-3)$

$\therefore f'(x) = e^{x^2-3x} \cdot (2x-3)$

$\therefore D(f') = \mathbb{R}$

$f'(x) = 0$

$\therefore e^{x^2-3x} \cdot (2x-3) = 0$

$\begin{cases} e^{x^2-3x} = 0 \Rightarrow \nexists x \in \mathbb{R} \\ 2x-3 = 0 \Rightarrow 2x = 3 \Rightarrow x = \frac{3}{2} = 1.5 \end{cases}$

$\therefore 2x-3 = 0 \Rightarrow 2x = 3 \Rightarrow x^2 = 1 \Rightarrow x = \pm\sqrt{1} = \pm 1$

$\therefore f'(x) \begin{matrix} + & + & + & - & - & - & + & + & + \end{matrix} \rightarrow D(f')$

$\therefore f(x)$ tem máximo relativo em $x = -1$

$\therefore f(x)$ tem mínimo relativo em $x = 1$

x	f(x)
-1	e^4
1	e^{-2}

LISTA 1.5 $f(x) = \frac{1-x^3}{x^2}$

Sol.: $D(f) = \mathbb{R}^*$

$f'(x) = \frac{(-3x^2) \cdot x^2 - (1-x^3) \cdot 2x}{(x^2)^2}$

$f'(x) = \frac{-3x^4 - 2x + 2x^4}{x^4}$

$f'(x) = \frac{-x^4 - 2x}{x^4} = \frac{x \cdot (-x^3 - 2)}{x^4}$

$f'(x) = \frac{-x^3 - 2}{x^3}$

$\therefore D(f') = \mathbb{R}^*$

$\therefore f'(x) = 0 \Rightarrow \frac{-x^3 - 2}{x^3} = 0$

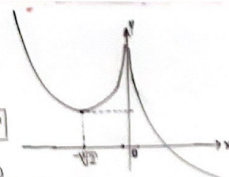
$\therefore -x^3 - 2 = 0$

$\therefore x^3 = -2$

$\therefore x = \sqrt[3]{-2} = -\sqrt[3]{2}$

$\therefore f'(x) \begin{matrix} - & - & - & + & + & 0 & - \end{matrix} \rightarrow D(f')$

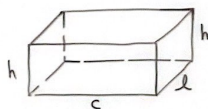
$\therefore f(x)$ tem mínimo relativo em $x = -\sqrt[3]{2}$





EXERCÍCIOS

Lista 10)



$$c = 3 \cdot l$$

$$V = 36 \text{ cm}^3$$

$$V(c, l, h) = c \cdot l \cdot h = 36$$

$$\therefore 3l^2 \cdot h = 36$$

$$\therefore l^2 \cdot h = 12$$

$$\therefore h = \frac{12}{l^2}$$

$$\therefore A_s(c, l, h) = 2cl + 2ch + 2lh$$

$$\therefore A_s(l, h) = 6l^2 + 6lh + 2lh$$

$$A_s(l, h) = 6l^2 + 8lh$$

$$A_s(l) = 6l^2 + 8l \cdot \frac{12}{l^2}$$

$$A_s(l) = 6l^2 + \frac{96}{l}$$

$$A_s(l) = \frac{6l^3 + 96}{l}$$

$$D(A_s) = (0, +\infty)$$

$$\therefore A_s'(l) = \frac{18l^2 \cdot l - (6l^3 + 96) \cdot 1}{l^2}$$

$$A_s'(l) = \frac{18l^3 - 6l^3 - 96}{l^2}$$

$$A_s'(l) = \frac{12l^3 - 96}{l^2}$$

$$\therefore D(A_s') = (0, +\infty)$$

$$\therefore A_s'(l) = 0 \Rightarrow 12l^3 - 96 = 0$$

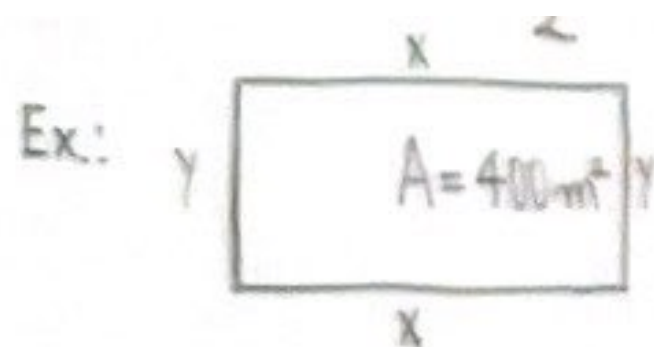
$$\therefore 12l^3 = 96 \Rightarrow l^3 = 8 \Rightarrow \boxed{l = 2 \text{ cm}}$$

$$\therefore A_s'(l) \underset{(Min. REL.)}{0} \rightarrow \frac{-}{+} \rightarrow \frac{+}{+} \rightarrow D(A_s')$$

$$\therefore c = 6 \text{ cm}$$

$$\therefore h = \frac{12}{2^2} = 3 \text{ cm}$$

$$A_{s, MINIMA} = A_s(2) = \frac{6 \cdot 2^3 + 96}{2} = \frac{48 + 96}{2} = \frac{144}{2} = 72 \text{ cm}^2$$



$$A(x, y) = x \cdot y = 400$$

$$\therefore y = \frac{400}{x}$$

Sol:

$$C(x, y) = 2 \cdot x + 2 \cdot y$$

$$C(x) = 2 \cdot x + 2 \cdot \frac{400}{x} = \frac{2x^2 + 800}{x}$$



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$$\therefore C'(x) = \frac{4x \cdot x - (2x^2 + 800) \cdot 1}{x^2}$$

$$C'(x) = \frac{2x^2 - 800}{x^2}$$

$$\therefore C'(x) = 0 \Rightarrow 2x^2 - 800 = 0$$

$$\therefore 2x^2 = 800 \Rightarrow x^2 = 400$$

$$x = \pm 20 \quad \text{logo, } x = 20 \text{ m}$$

$$\therefore y = \frac{400}{20} = 20 \text{ m}$$



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$$\therefore C'(x) = \frac{4x \cdot x - (2x^2 + 800) \cdot 1}{x^2}$$

$$C'(x) = \frac{2x^2 - 800}{x^2}$$

$$C'(x) = 0 \Rightarrow 2x^2 - 800 = 0$$

$$\therefore 2x^2 = 800 \Rightarrow x^2 = 400$$

$$x = \pm 20 \quad \text{logo, } x = 20 \text{ m}$$

$$\therefore y = \frac{400}{20} = 20 \text{ m}$$

$$= 2cl + 2ch + 2lh$$

$$l = 6l^2 + 6lh + 2lh$$

$$= 6l^2 + 8lh$$

$$= 6l^2$$

$$= 6l^2$$

$$Q_{\text{minimo}} = C(20) = 80 \text{ m}$$

