

LISTA DO 1º BIM.

CÁLCULO I

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ENG. DE ALIM.
UFT/ PALMAS/TO

② $f(x) = 5x + 4$

$$f'(x) = \lim_{\Delta x \rightarrow 0} \frac{f(x + \Delta x) - f(x)}{\Delta x}$$

$$f'(x) = \lim_{\Delta x \rightarrow 0} \frac{5(x + \Delta x) + 4 - (5x + 4)}{\Delta x}$$

$$f'(x) = \lim_{\Delta x \rightarrow 0} \frac{\cancel{5x} + 5\Delta x + \cancel{4} - \cancel{5x} - \cancel{4}}{\Delta x}$$

$$f'(x) = \lim_{\Delta x \rightarrow 0} \frac{5\Delta x}{\Delta x}$$

$$f'(x) = \lim_{\Delta x \rightarrow 0} 5$$

$$f'(x) = 5$$

③ Eq. DA RETA TANGENTE:

$$(*) \quad y - y_0 = m(x - x_0)$$

① $y_0 = f(x_0)$; $x_0 = 2$ $y_0 = f(2)$
 $f(2) = 5 \cdot 2 + 4 = 14$; $y_0 = 14$

② $m = f'(x_0) = f'(2)$

$$f'(x) = 5 \rightarrow m = f'(2) = 5$$

SUBST. ① e ② EM (*):

$$y - 14 = 5(x - 2)$$

$$y = 5x - 10 + 14$$

$$y = 5x + 4 \rightsquigarrow \text{Eq. DA RETA TANGENTE}$$

④ ③ $f(x) = x^3 - 3x^2 + 5x - 2$

REGRAS: $f(x) = ax^n \Rightarrow f'(x) = a \cdot n \cdot x^{n-1}$

RESP.: $f'(x) = 3x^2 - 6x + 5$

$$\textcircled{17} \quad g(x) = 3/x^2 + 5/x^4$$

$$g(x) = 3x^{-2} + 5x^{-4}$$

$$g'(x) = -6x^{-3} - 20x^{-5}$$

$$g'(x) = -\frac{6}{x^3} - \frac{20}{x^5}$$

$$\textcircled{28} \quad D_y \left(\frac{2y+1}{3y+4} \right)$$

$$(*) \quad g(y) = \frac{a(y)}{b(y)} \Rightarrow g'(y) = \frac{a'(y) \cdot b(y) - a(y) \cdot b'(y)}{[b(y)]^2}$$

ONDE

$$\textcircled{i} \quad a(y) = 2y+1 \Rightarrow a'(y) = 2$$

$$\textcircled{ii} \quad b(y) = 3y+4 \Rightarrow b'(y) = 3$$

SUBST. $\textcircled{i} \in \textcircled{ii} \in (*)$:

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

$$g'(y) = \frac{\cancel{6y} + 8 - \cancel{6y} - 3}{9y^2 + 24y + 16}$$

$$g'(y) = \frac{5}{9y^2 + 24y + 16}$$

$$\textcircled{34} \quad \frac{d}{dx} \left(\frac{x^2 - a^2}{x^2 + a^2} \right)$$

$$f(x) = (x^2 - a^2) / (x^2 + a^2)$$

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

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

$$f'(x) = \frac{\cancel{2x^5} + 2xa^2 - \cancel{2x^3} + 2a^2x}{x^4 + 2x^2a^2 + a^4}$$

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

21) $f(x) = (2x^4 - 1) \cdot (5x^3 + 6x)$

(*) $f(x) = a(x) \cdot b(x)$

$f'(x) = a'(x) \cdot b(x) + a(x) \cdot b'(x)$

NOTE:

(i) $a(x) = 2x^4 - 1 \Rightarrow a'(x) = 8x^3$

(ii) $b(x) = 5x^3 + 6x \Rightarrow b'(x) = 15x + 6$

SUBST. i) & ii) in (*):

$$f'(x) = 8x^3 \cdot (5x^3 + 6x) + (2x^4 - 1) \cdot (15x + 6)$$

$$f'(x) = 40x^6 + 48x^4 + 30x^5 + 12x^4 - 15x - 6$$