Exercício 2.7b

sexta-feira, 29 de setembro de 2023 10:00

b) Equação Reduzida de todas as retas tangentes à curva $f(x) = 3x^3 + x + 4$, que passam pelo ponto $(1,5)$

$m = f'(x) = 9x^2 + 1$

$\boxed{m = 9x^2 + 1}$

$m = \frac{y_2 - y}{x_2 - x} = \frac{y_2 - 5}{x_2 - 1}$

$9x_2^2 + 1 = \frac{(3x_2^3 + x_2 + 4) - 5}{x_2 - 1}$

$(9x_2^2 + 1)(x_2 - 1) = 3x_2^3 + x_2 + 4 - 5$

$9x_2^3 - 9x_2^2 + x_2 - 1 = 3x_2^3 + x_2 - 1$

$9x_2^3 - 9x_2^2 + x_2 - 1 - 3x_2^3 - x_2 + 1 = 0$

$6x_1^3 - 9x_2^2 = 0$

$x^2(6x - 9) = 0$

$x^2 = 0$

$6x - 9 = 0$

$x = \frac{9}{6}$

$x = \frac{3}{2}$

$x = 0$

$m = 9(x)^2 + 1$

$= 9(0)^2 + 1$

$\boxed{m = 1}$

$f(0) = 3(0)^3 + 0 + 4$

$y = f(0) = 4$

$y = mx + b$

$4 = 1(0) + b$

$b = 4$

$\boxed{y = x + 4}$

$x = \frac{3}{2}$

$m = 9\left(\frac{3}{2}\right)^2 + 1$

$= 9\left(\frac{9}{4}\right) + 1$

$= \frac{81}{4} + 1$

$\boxed{m = \frac{85}{4}}$

$f(3/2) = 3\left(\frac{3}{2}\right)^3 + \frac{3}{2} + 4$

$= 3\left(\frac{27}{8}\right) + \frac{3}{2} + 4$

$= \frac{81}{8_{/1}} + \frac{3}{2_{/4}} + \frac{4}{1_{/8}}$

$= \frac{81 + 12 + 32}{8}$

$y = f(3/2) = \frac{125}{8}$

$\frac{125}{8} = \frac{85}{4}\left(\frac{3}{2}\right) + b$

$\frac{125}{8} = \frac{255}{8} + b$

$\frac{125}{8} - \frac{255}{8} = b$

$\frac{125 - 255}{8} = b$

$b = -\frac{130}{8} = -\frac{65}{4}$

$\boxed{y = \frac{85}{4}x - \frac{65}{4}}$