## I. DERIVADAS POR DEFINIÇÃO, EQUAÇÃO DA RETA TANGENTE

1) Determine a equação da reta tangente à função $f(x)$ no ponto indicado:

a) $f(x) = x^2 \quad x = 2$

b) $f(x) = \frac{1}{x} \quad x = 2$

c) $f(x) = \sqrt{x} \quad x = 9$

d) $f(x) = x^2 - x \quad x = 1$

2) Calcule $f'(x)$, ~~pela definição~~.

a) $f(x) = x^2 + x \quad x = 1$

b) $f(x) = \sqrt{x} \quad x = 4$

c) $f(x) = 5x - 3 \quad x = -3$

d) $f(x) = \frac{1}{x} \quad x = 1$

e) $f(x) = \sqrt{x} \quad x = 3$

f) $f(x) = \frac{1}{x^2} \quad x = 2$

g) $f(x) = 3x - 1$

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

i) $f(x) = \frac{x}{x+1}$

j) $f(x) = \sqrt{3x+4}$

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

l) $f(x) = \sqrt{2x-5}$

## Soluções:

1 - a) $y = 4x - 4$ b) $y = -\frac{1}{4}x + 1$ c) $x - 6y + 9 = 0$ d) $y = x - 1$

2 - a) $3$ b) $\frac{1}{4}$ c) $5$ d) $-1$ e) $\frac{1}{2\sqrt{3}}$ f) $-\frac{1}{4}$ g) $3$

h) $3x^2$ i) $\frac{1}{(x+1)^2}$ j) $\frac{3}{2\sqrt{3x+4}}$ k) $\frac{10}{(2x+4)^2}$ l) $\frac{1}{\sqrt{2x-5}}$

## II. REGRAS DE DERIVAÇÃO

1) Determine a derivada da função indicada:

1) $f(x) = -\frac{1}{2}x^4 + \frac{2}{3}x^3 - \frac{1}{2}x^2 + \frac{1}{4}$ $\qquad f'(x) = -2x^3 + 2x^2 - x$

2) $f(x) = x^2 + \sqrt{x}$ $\qquad f'(x) = 2x + \frac{1}{2\sqrt{x}}$

3) $f(x) = x^3 \cos x$ $\qquad f'(x) = 3x^2 \cos x - x^3 senx$

4) $f(x) = x^3(2x^2 - 3x)$ $\qquad f'(x) = 10x^4 - 12x^3$

5) $f(x) = \frac{2x+5}{4x}$ $\qquad f'(x) = -\frac{5}{4x^2}$

6) $f(x) = \left(\frac{2}{5}\right)^x$ $\qquad f'(x) = \left(\frac{2}{5}\right)^x \ln\frac{2}{5}$

7) $f(x) = 2^{3x-1}$ $\qquad f'(x) = 2^{3x-1}.3\ln 2$

8) $f(x) = 3^x$ $\qquad f'(x) = 3^x \ln 3$

9) $f(x) = sen(x^2)$ $\qquad f'(x) = 2x.\cos(x^2)$

10) $f(x) = \cos\left(\frac{1}{x}\right)$ $\qquad f'(x) = \frac{1}{x^2} sen\left(\frac{1}{x}\right)$

11) $f(x) = (x^2 + 5x + 2)^7$ $\qquad f'(x) = 7(x^2 + 5x + 2)^6(2x+5)$

12) $f(x) = \left(\frac{3x+2}{2x+1}\right)^5$ $\qquad f'(x) = 5\left(\frac{3x+2}{2x+1}\right)^4 . \frac{-1}{(2x+1)^2}$

13) $f(x) = \frac{1}{3}(2x^5 + 6x^{-3})^5$ $\qquad f'(x) = \frac{10}{3}(2x^5 + 6x^{-3})^4.(5x^4 - 9x^{-4})$

14) $y = \ln(x^6 - 1)$ $\qquad y' = \frac{6x^5}{x^6 - 1}$

15) $y = \frac{1}{\sqrt[5]{x^3 - 1}}$ $\qquad y' = \frac{3x^2}{5(x^3-1)^{\frac{6}{5}}}$

16) $y = \cos(x^3 - 4)$ $\qquad y' = -sen(x^3 - 4)(3x^2)$

17) $y = (x^3 - 6)^5$ $\qquad y' = 15x^2(x^3 - 6)^4$

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| 18) $y = 3x^2 + 5$ | $y' = 6x$ |
| 19) $y = 2\sqrt[3]{x}$ | $y' = \dfrac{2}{3\sqrt[3]{x^2}}$ |
| 20) $y = \dfrac{4}{x} + \dfrac{5}{x^2}$ | $y' = -\dfrac{4}{x^2} - \dfrac{10}{x^3}$ |
| 21) $y = \dfrac{x}{x^2+1}$ | $y' = \dfrac{1-x^2}{(x^2+1)^2}$ |
| 22) $y = \dfrac{3x^2+3}{5x-3}$ | $y' = \dfrac{15x^2-18x-15}{(5x-3)^2}$ |
| 23) $y = \dfrac{\sqrt{x}}{x+1}$ | $y' = \dfrac{1-x}{2\sqrt{x}(x+1)^2}$ |
| 24) $y = \dfrac{\cos x}{x^2+1}$ | $y' = -\dfrac{(x^2+1).senx + 2x\cos x}{(x^2+1)^2}$ |
| 25) $y = \dfrac{3}{senx + \cos x}$ | $y' = \dfrac{-3(\cos x - senx)}{(senx+\cos x)^2}$ |
| 26) $y = \cos x + (x^2+1)senx$ | $y' = senx(2x-1) + \cos x(x^2+1)$ |
| 27) $y = \dfrac{x+1}{x.senx}$ | $y' = -\dfrac{x(x+1).\cos x + senx}{x^2.sen^2 x}$ |
| 28) $y = sen4x$ | $y' = 4.\cos 4x$ |
| 29) $y = e^{3x}$ | $y' = 3e^{3x}$ |
| 30) $y = sent^3$ | $y' = 3t^2\cos t^3$ |
| 31) $y = \ln(2t+1)$ | $y' = \dfrac{2}{2t+1}$ |
| 32) $y = (senx+\cos x)^3$ | $y' = 3(senx+\cos x)^2(\cos x - senx)$ |
| 33) $y = \sqrt{3x+1}$ | $y' = \dfrac{3}{2\sqrt{3x+1}}$ |
| 34) $y = \sqrt[3]{\dfrac{x-1}{x+1}}$ | $y' = \dfrac{2}{3(x+1)^2}.\sqrt[3]{\left(\dfrac{x+1}{x-1}\right)^2}$ |
| 35) $y = \ln(t^2+3t+9)$ | $y' = \dfrac{2t+3}{t^2+3t+9}$ |
| 36) $y = sen(\cos x)$ | $y' = -senx.\cos(\cos x)$ |

37) $y = (t^2 + 3)^4$ $\qquad y' = 8t(t^2 + 3)^3$

38) $y = \cos(x^2 + 3)$ $\qquad y' = -2xsen(x^2 + 3)$

39) $y = \sqrt{x + e^x}$ $\qquad y' = \dfrac{1 + e^x}{2\sqrt{x + e^x}}$

40) $y = \sec 3x$ $\qquad y' = 3\sec 3xtg3x$

41) $y = \cos 8x$ $\qquad y' = -8sen8x$

42) $y = e^{sent}$ $\qquad y' = e^{sent}.\cos t$

43) $y = e^{-5x}$ $\qquad y' = -5e^{-5x}$

44) $y = \cos e^x$ $\qquad y' = -e^x.sene^x$