I. DERIVADAS POR DEFINIÇÃO, EQUAÇÃO DA RETA TANGENTE

1) Determine a equação da reta tangente à curva $y = f(x)$ no ponto de abscissa indicada:

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

Respostas:

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:

$1) f(x) = -\frac{1}{2}x^4 + \frac{2}{3}x^3 - \frac{1}{2}x^2 + \frac{1}{4}$	$f'(x) = -2x^3 + 2x^2 - x$
$2) f(x) = x^2 + \sqrt{x}$	$f'(x) = 2x + \frac{1}{2\sqrt{x}}$
$3) f(x) = x^3 \cos x$	$f'(x) = 3x^2 \cos x - x^3 \text{sen} x$
$4) f(x) = x^3(2x^2 - 3x)$	$f'(x) = 10x^4 - 12x^3$
$5) f(x) = \frac{2x+5}{4x}$	$f'(x) = -\frac{5}{4x^2}$
$6) f(x) = \left(\frac{2}{5}\right)^x$	$f'(x) = \left(\frac{2}{5}\right)^x \ln\frac{2}{5}$
$7) f(x) = 2^{3x-1}$	$f'(x) = 2^{3x-1}.3n2$
$8) f(x) = 3^x$	$f'(x) = 3^x \ln 3$
$9) f(x) = \text{sen}(x^2)$	$f'(x) = 2x.\cos(x^2)$
$10) f(x) = \cos\left(\frac{1}{x}\right)$	$f'(x) = \frac{1}{x^2}\text{sen}\left(\frac{1}{x}\right)$
$11) f(x) = (x^2 + 5x + 2)^7$	$f'(x) = 7(x^2 + 5x + 2)^6(2x + 5)$
$12) f(x) = \left(\frac{3x+2}{2x+1}\right)^5$	$f'(x) = 5\left(\frac{3x+2}{2x+1}\right)^4 . \frac{-1}{(2x+1)^2}$
$13) f(x) = \frac{1}{3}(2x^5 + 6x^{-3})^5$	$f'(x) = \frac{10}{3}(2x^5 + 6x^{-3})^4 . (5x^4 - 9x^{-4})$
$14) y = \ln(x^6 - 1)$	$y' = \frac{6x^5}{x^6 - 1}$
$15) \text{y} = \frac{1}{\sqrt[5]{x^3 - 1}}$	$\text{y}' = \frac{3x^2}{5\sqrt[5]{(x^3 - 1)^6}}$
$16) y = \cos(x^3 - 4)$	$y' = -3x^2 \text{sen}(x^3 - 4)$
$17) y = (x^3 - 6)^5$	$y' = 15x^2(x^3 - 6)^4$

18) $y = 3x^2 + 5$ $y' = 6x$

19) $y = 2\sqrt[3]{x}$ $y' = \frac{2}{3\sqrt[3]{x^2}}$

20) $y = \frac{4}{x} + \frac{5}{x^2}$ $y' = -\frac{4}{x^2} - \frac{10}{x^3}$

21) $y = \frac{x}{x^2+1}$ $y' = \frac{1-x^2}{(x^2+1)^2}$

22) $y = \frac{3x^2+3}{5x-3}$ $y' = \frac{15x^2-18x-15}{(5x-3)^2}$

23) $y = \frac{\sqrt{x}}{x+1}$ $y' = \frac{1-x}{2\sqrt{x}(x+1)^2}$

24) $y = \frac{\cos x}{x^2+1}$ $y' = -\frac{(x^2+1).\text{sen}x + 2x\cos x}{(x^2+1)^2}$

25) $y = \frac{3}{\text{sen}x + \cos x}$ $y' = \frac{-3(\cos x - \text{sen}x)}{(\text{sen}x + \cos x)^2}$

26) $y = \cos x + (x^2+1)\text{sen}x$ $y' = (2x-1)\text{sen}x + (x^2+1)\cos x$

27) $y = \frac{x+1}{x.\text{sen}x}$ $y' = -\frac{x(x+1).\cos x + \text{sen}\, x}{x^2.\text{sen}^2\, x}$

28) $y = \text{sen}\, 4x$ $y' = 4.\cos 4x$

29) $y = e^{3x}$ $y' = 3e^{3x}$

30) $y = \text{sen}\, t^3$ $y' = 3t^2 \cos t^3$

31) $y = \ln(2t+1)$ $y' = \frac{2}{2t+1}$

32) $y = (\text{sen}\, x + \cos x)^3$ $y' = 3(\text{sen}\, x + \cos x)^2(\cos x - \text{sen}\, x)$

33) $y = \sqrt{3x+1}$ $y' = \frac{3}{2\sqrt{3x+1}}$

34) $y = \sqrt[3]{\frac{x-1}{x+1}}$ $y' = \frac{2}{3(x+1)^2}.\sqrt[3]{\left(\frac{x+1}{x-1}\right)^2}$

35) $y = \ln(t^2+3t+9)$ $y' = \frac{2t+3}{t^2+3t+9}$

36) $y = \text{sen}(\cos x)$ $y' = -\text{sen}\, x.\cos(\cos x)$

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

38) $y = \cos(x^2 + 3)$ $y' = -2x\,\text{sen}(x^2 + 3)$

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

40) $y = \sec 3x$ $y' = 3\sec(3x)\,\text{tg}(3x)$

41) $y = \cos 8x$ $y' = -8\,\text{sen}\,8x$

42) $y = e^{\text{sen}\,t}$ $y' = e^{\text{sen}\,t}.\cos t$

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

44) $y = \cos e^x$ $y' = -e^x.\text{sen}\,e^x$

45) $y = 5x^2.\text{sen}(2x) + \cos(3x)$ $y' = 10x^2.\cos(2x) + 10x.\text{sen}(2x) - 3\text{sen}(3x)$

46) $y = \dfrac{t^2 + 3t}{t - 1}$ $y' = \dfrac{t^2 - 2t - 3}{(t - 1)^2}$

47) $y = 2\sqrt[3]{x^2} + \cos(4x)$ $y' = \dfrac{4}{3\sqrt[3]{x}} - 4\text{sen}(4x)$

48) $y = \sqrt[3]{2x^2 - e^{-3x}}$ $y' = \dfrac{4x + 3e^{-3x}}{3\sqrt[3]{(2x^2 - e^{-3x})^2}}$

49) $y = \dfrac{-5x^2}{2x.\cos(x)}$ $y' = \dfrac{-5[\cos(x) + \text{sen}(x)]}{2.\cos^2(x)}$