# ESERCIZI COMPITO

- $y = \operatorname{sen} x - \tan x$
- $y = x^2 (e^x - 1)$
- $y = 5^x - 3x^2$
- $y = (1-x)(x^3-1)(x+1) + x^5$
- $f(x) = \dfrac{1-x}{x}$ $\quad x_0 = 3 \quad h = \text{generico}$
- $f(x) = x + \ln x$
- $y = \tan x \ln x$
- $y = \dfrac{3}{3-x} - \dfrac{x}{x+2}$
- $y = \ln (x^2+2)$
- $y = \cot (2x-1) - \operatorname{sen} (3x-1) - \ln (3x-2)$
- $y = (x^2-3)(x+1)^3$
- $y = \dfrac{(x-2)^2}{x^2}$ ; $y = \sqrt[7]{(2x+1)}$
- $y = \ln (\tan \sqrt{x})$
- $y = (x^3+1)^{x^2 1}$ ; $y = (\ln x)^{\ln x}$
- $y = \ln (\operatorname{sen} x) \operatorname{sen} (\cos x)$
- $y = \sqrt{(x+1)^3}$ ; $\sqrt{9-x^2}$

- $y = e^{5x+3}$
- $y = (\operatorname{sen} x)^{\cos x}$
- $y = 2 \tan x - \arctan x$
- $y = \ln x - \arctan x - 3 \arctan x + \sqrt{\pi}$
- $y = \cos^2 x$
- $y = 2x^3 + 3$ (fare il differenziale)
- $y = x^3 - 2x + 5$ (fare il differenziale)
- $y = e^{-x} + 2e^x$ (fare il differenziale)
- $y = \operatorname{sen}^3 2x$ (fare il differenziale)
- $y = e^{\operatorname{sen} x}$ (fare il differenziale)
- $y = \sqrt{\dfrac{1-x}{1+x}}$ (fare il differenziale)
- $y = \ln |x^2-1| + \ln (x^2+1)$
- $y = \ln \dfrac{1-x}{1+x} - 2 \ln (1-x^2)$
- $y = \ln \sqrt{\operatorname{arctg} 2x}$
- $y = \left(\operatorname{tg} \dfrac{\pi}{3}\right)^{2 \operatorname{sen}^2 2x}$

# Esercizi derivate

1) $y = \sin x - \operatorname{tg} x$

$y' = \cos x - \dfrac{1}{\cos^2 x}$

2) $y = x^2(e^x - 1)$

$y' = 2x(e^x - 1) + x^2 e^x$

3) $y = 5^x - 3x^2$

$y' = 5^x \ln 5 - 6x$

4) $y = (1-x)(x^3-1)(x+1) + x^5$

$y = (1-x^2)(x^3-1) + x^5$

5) $f(x) = \dfrac{1-x}{x}$ $\quad x_0 = 3$

$$f(x_0) = f(3) = \frac{1-3}{3} = -\frac{2}{3}$$

$$\left[ f'(x_0) = \lim_{h \to 0} \frac{f(x_0+h) - f(x_0)}{h} \right]$$

$$\lim_{h \to 0} \frac{\overbrace{\frac{1-(3+h)}{3+h}}^{f(3+h)} - \overbrace{\left(-\frac{2}{3}\right)}^{f(3)}}{h}$$

$$\lim_{h \to 0} \frac{\frac{1-(3+h)}{3+h} + \frac{2}{3}}{h}$$

$$\lim_{h \to 0} \frac{\cancel{1-3} + h \cancel{+2} + \frac{2}{3}h}{(3+h)h}$$

$$\lim_{h \to 0} \frac{\frac{5}{3}\cancel{h}}{(3+h)\cancel{h}} = \frac{5}{9} = f'(3)$$

c) $f(x) = x + \ln x \qquad x_0 = 3$

$$\lim_{h \to 0} \frac{f(3+h) - f(3)}{h}$$

$$\lim_{h \to 0} \frac{3 + h + \ln(3+h) - (3 + \ln 3)}{h}$$

$$\lim_{h \to 0} \frac{h + \ln(3+h) - \ln 3}{h} = \frac{0}{0}$$

$$\lim_{h \to 0} \frac{h + \ln\left(\frac{3+h}{3}\right)}{h}$$

$$\lim_{h \to 0} \frac{\cancel{h}^{1}}{\cancel{h}} + \frac{\ln\left(1 + \frac{h}{3}\right)}{h} \cdot \frac{3}{3}$$

$$\lim_{h \to 0} 1 + \underbrace{\frac{\ln\left(1+\frac{h}{3}\right)}{\frac{h}{3}}}_{1} \cdot \frac{1}{3} = 1 + \frac{1}{3} = \frac{4}{3}$$

$$f'(3) = \frac{4}{3}$$

$$y' = -2x(x^3-1) + (1-x^2)(3x^2) + 5x^4$$

$$y' = -2x^4 + 2x + 3x^2 - 3x^4 + 5x^4$$

$$y' = 2x + 3x^2$$

7) $y = \operatorname{tg} x \ln x$

$$y' = \frac{1}{\cos^2 x} \ln x + \operatorname{tg} x \cdot \frac{1}{x} \Rightarrow$$

$$y' = \frac{\ln x}{\cos^2 x} + \frac{\operatorname{tg} x}{x}$$

8) $y = \frac{3}{3-x} - \frac{x}{x+2}$

$$y' = \frac{0(3-x) + 3(-1)}{(3-x)^2} - \frac{1\cdot(x+2) - x\cdot 1}{(x+2)^2}$$

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

9) $y = \ln(x^2+2)$

$$y' = \frac{1}{x^2+2} \cdot 2x$$

$$y' = \frac{2x}{x^2+2}$$

10) $y = \cot(2x-1) - \sin(3x-1) - \ln(3x-2)$

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

$$y' = \frac{-2}{\sin^2(2x-1)} - 3\cos(3x-1) - \frac{3}{3x-2}$$

11) $y = (x^2-3)(x+1)^3$

$$y' = 2x(x+1)^3 + (x^2-3)\cdot 3\cdot (x+1)^2\cdot 1$$

$$y' = 2x(x+1)^3 + 3(x^2-3)(x+1)^2$$

12) • $y = \dfrac{(x-2)^2}{x^2}$

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

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

• $y = \sqrt[7]{(2x+1)}$

$$y = (2x+1)^{\frac{1}{7}}$$

$$y' = \frac{1}{7}(2x+1)^{\frac{1}{7}-1}\cdot 2$$

$$y' = \frac{1}{7}(2x+1)^{-6/7} \cdot 2 = \frac{2}{7(2x+1)^{6/7}}$$

$$y' = \frac{2}{7 \cdot \sqrt[7]{(2x+1)^6}}$$

13) $y = \ln(\operatorname{tg}\sqrt{x})$

$$y' = \frac{1}{\operatorname{tg}\sqrt{x}} \cdot \frac{1}{\cos^2(\sqrt{x})} \cdot \frac{1}{2\sqrt{x}}$$

14) $y = (x^3+1)^{x^2-1}$

$$\left[ \log_a b = c \rightarrow a^c = b \Rightarrow \right.$$

$$\Rightarrow a^{\log_a b} = b$$

$$\left. a = e \quad b = (x^3+1)^{x^2-1} \right]$$

$$y = e^{\ln (x^3+1)^{(x^2-1)}} \qquad \left[\log_a (b)^c = c \cdot \lg_a b\right]$$

$$y = e^{(x^2-1)\ln(x^3+1)}$$

$$y' = e^{(x^2-1)\ln(x^3+1)} \cdot \left[2x \ln(x^3+1) + \right.$$

$$\left. + (x^2-1) \cdot \frac{1}{x^3+1} \cdot 3x^2\right]$$

$$y' = (x^3+1)^{(x^2-1)} \cdot \left[2x \ln(x^3+1) + \right.$$

$$\left. + \frac{3x^2(x^2-1)}{x^3+1}\right]$$

15) $y = \ln(\sin x)\sin(\cos x)$

$$y' = \frac{1}{\sin x} \cdot \cos x \cdot \sin(\cos x) +$$

$$+ \ln(\sin x) \cdot \cos(\cos x) \cdot (-\sin x)$$

$$y' = \frac{\cos x \cdot \sin(\cos x)}{\sin x} +$$

$$+ \cos(\cos x)(-\sin x)\ln(\sin x)$$

22) $y = 2x^3 + 3$

$dy = 6x^2 \, dx$

23) $y = x^3 - 2x + 5$

$dy = 3x^2 \, dx - 2 \, dx$

$dy = (3x^2 - 2) \, dx$