

ESERCITAZIONE di MATEMATICA GENERALE - CLEF

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07/11/2019 - A.A. 2019/2020

Es. 1. Calcolare la Derivata Prima delle seguenti funzioni.

(**a**) Derivata di un Prodotto & di un Rapporto.

$$\frac{d}{dx} (f(x) \cdot g(x)) = f'(x) \cdot g(x) + f(x) \cdot g'(x). \quad \frac{d}{dx} \left(\frac{f(x)}{g(x)} \right) = \frac{f'(x) \cdot g(x) - f(x) \cdot g'(x)}{(g(x))^2}$$

a.1) $f(x) = x \log(x);$

a.2) $f(x) = x^{-1}(e^x);$

a.3) $f(x) = x^2 \cdot x^3;$

a.4) $f(x) = \sqrt[3]{x} \cdot \log(x);$

a.5) $f(x) = x(x^2 - 2)^5;$

a.6) $f(x) = (x^2 - 8x + 6) \log(x);$

a.7) $f(x) = x \log x;$

a.8) $f(x) = \frac{x-1}{x+2};$

a.9) $f(x) = \frac{x^2-x^3}{x};$

a.10) $f(x) = \frac{\log(x)}{e^x};$

a.11) $f(x) = \frac{e^x}{x^2+1};$

a.12) $f(x) = \frac{e^x}{\log(x)-x};$

a.13) $f(x) = (x^2 + \log(x)) e^x;$

a.14) $f(x) = (\sqrt{x}) \log(x);$

a.15) $f(x) = \frac{2x}{1-x^2};$

a.16) $f(x) = \frac{\sqrt{x}}{1+x};$

a.17) $f(x) = \sqrt[3]{x} e^{2x};$

a.18) $f(x) = \frac{x^2-1}{4x};$

a.19) $f(x) = \frac{x^5-5x^3}{\log(x)-x};$

a.20) $f(x) = 2x\sqrt{5-2x};$

a.21) $f(x) = \frac{x^2+3}{x-5};$

a.22) $f(x) = x^3\sqrt{x};$

(**b**) Derivate di Potenze.

$$\frac{d}{dx}(x^\alpha) = \alpha \cdot x^{\alpha-1}. \quad \frac{d}{dx}(f(x))^\alpha = \alpha (f(x))^{\alpha-1} \cdot f'(x), \quad \alpha \in \mathbb{Q}$$

b.1) $f(x) = x^5 - x^4;$

b.2) $f(x) = x^3 + x^{-2} + x^{\frac{2}{3}};$

b.3) $f(x) = x^6 + 3x^2 + \frac{1}{4} - 1;$

b.4) $f(x) = 1000 + \frac{3}{x^4};$

b.5) $f(x) = \sqrt{x} + \sqrt[4]{x^5} - 12\sqrt[3]{x^2} + \frac{3}{\sqrt{x^7}};$

b.6) $f(x) = x^3 - 3x + 7;$

b.7) $f(x) = 3x^3 - 27x^2 + 1;$

b.8) $f(x) = (x^4 - 7x)^3;$

b.9) $f(x) = \log^2(x);$

b.10) $f(x) = e^{100x};$

b.11) $f(x) = (\log(x) - e^x + \sqrt{x})^5;$

b.12) $f(x) = (x^{10} - \log(x) + x^{-\frac{2}{17}})^{10};$

b.13) $f(x) = \sqrt[4]{(x^{13} - x^{-11} + \log^9(x) - e^{2x})^3};$

b.14) $f(x) = \sqrt{x^2 + 1};$

$$\text{b.15)} \quad f(x) = \sqrt{\frac{x+1}{x-2}};$$

$$\text{b.16)} \quad f(x) = \sqrt{\frac{2}{x-1}};$$

$$\text{b.17)} \quad f(x) = \sqrt{\frac{x^3-1}{x+1}};$$

$$\text{b.18)} \quad (*) \quad f(x) = x^\pi;$$

(c) Derivate di Esponenziali.

$$\frac{d}{dx}(e^x) = e^x; \quad \frac{d}{dx}(e^{f(x)}) = f'(x) \cdot e^{f(x)}$$

$$\text{c.1)} \quad f(x) = e^x + e^{-x};$$

$$\text{c.2)} \quad f(x) = e^{x^2-x^3};$$

$$\text{c.3)} \quad f(x) = e^{-x^7};$$

$$\text{c.4)} \quad f(x) = e^{\frac{x-1}{x+2}};$$

$$\text{c.5)} \quad f(x) = e^{-\frac{1}{x}};$$

$$\text{c.6)} \quad f(x) = \frac{e^x}{3-5e^{x^2}};$$

$$\text{c.7)} \quad f(x) = e^{\frac{x-1}{x^2-2}};$$

$$\text{c.8)} \quad f(x) = e^{x \log(x)};$$

$$\text{c.9)} \quad f(x) = \frac{e^{\sqrt{x^2-1}}}{\log(x)};$$

$$\text{c.10)} \quad f(x) = \sqrt{e^x - 2};$$

$$\text{c.11)} \quad f(x) = \frac{1}{x} e^{2x-1};$$

$$\text{c.12)} \quad f(x) = \frac{(x^2+1)e^{-x^2}}{\log(x)};$$

$$\text{c.13)} \quad f(x) = \frac{e^{-x}}{x^2-1};$$

$$\text{c.14)} \quad f(x) = \frac{\sqrt{2x-1}}{e^{x^2}};$$

$$\text{c.15)} \quad f(x) = e^{x^3-6x^2};$$

$$\text{c.16)} \quad f(x) = e^{\frac{\log(x^2-3)+\sqrt{x^3-1}}{x^2-e^{-x}}};$$

(d) Derivate di Logaritmiche.

$$\frac{d}{dx}(\log(x)) = \frac{1}{x}; \quad \frac{d}{dx}(\log(f(x))) = \frac{f'(x)}{f(x)}.$$

$$\text{d.1)} \quad f(x) = \log(x^5 - \sqrt{x});$$

$$\text{d.2)} \quad f(x) = \log\left(\frac{1}{\sqrt{x^3}}\right);$$

$$\text{d.3)} \quad f(x) = 2x^2 + x - \log(x);$$

$$\text{d.4)} \quad f(x) = \log(e^2 x + x);$$

$$\text{d.5)} \quad f(x) = \log(\log(x));$$

$$\text{d.6)} \quad f(x) = \log\left(\frac{\sqrt{x-1}}{x^2-x+1}\right);$$

$$\text{d.7)} \quad f(x) = x^2 \log(x) \sqrt{x};$$

$$\text{d.8)} \quad f(x) = x\sqrt{x} + e^x \log(x) + 2;$$

$$\text{d.9)} \quad f(x) = \log(x - \sqrt{e^x - x});$$

$$\text{d.10)} \quad f(x) = \frac{\log(x+1)}{x+1};$$

$$\text{d.11)} \quad f(x) = \log(x) + \sqrt{x-1};$$

$$\text{d.12)} \quad f(x) = \frac{\log x}{x};$$

$$\text{d.13)} \quad f(x) = \frac{2x-1}{\log(2x-1)};$$

(e) Derivate di Funzioni Composte (*).

$$\text{e.1)} \quad f(x) = e^{\frac{\sqrt{x+1}}{x^2}};$$

$$\text{e.2)} \quad f(x) = \log\left(\frac{x-1}{x^2-x-1} + e^{-x^2}\right);$$

$$\text{e.3)} \quad f(x) = \log(\sqrt{x^3 - 3x^2 - e^{2x}} - x^{-3});$$

$$\text{e.4)} \quad f(x) = \log\left(\frac{1-17x^3}{x-2\log(x^8)}\right);$$

$$\text{e.5)} \quad f(x) = \log\left(\log\left(x^3 - \sqrt[3]{e^{\frac{x-1}{x^2-3}} - x^{-1}} + \log(x)\right)\right);$$

$$\text{e.6)} \quad f(x) = e^{-x^2} (4x^3 - 3x^2 + 2x)^3 \log(\sqrt{x^4 + x} - x^2);$$

$$\text{e.7)} \quad f(x) = e^{\frac{4\sqrt{x^3-1} \log(x^2-1)}{x-x^5}};$$

$$\text{e.8)} \quad f(x) = \log\left(\sqrt{\frac{x^5-x^4-x^3}{x^2+x-1}}\right);$$

$$\text{e.9)} \quad f(x) = \frac{e^{\frac{x-1}{x^2+4}}}{\log\left(\frac{x-1}{x^2+4}\right)};$$