

**Corsi di Laurea della Facoltà di Agraria**  
**A.A. 2006/2007**  
**Matematica**  
**Esercizi del 13 novembre 2006**

Calcolare la derivata delle seguenti funzioni

**Esercizio 1.** Somma di funzioni:

$$f_1(x) = 2^x - \operatorname{sen} x + \arcsen x, \quad f_2(x) = \ln x + \cos x + e^x, \quad f_3(x) = \operatorname{tg} x + \sqrt{x} - \operatorname{arctg} x,$$
$$f_4(x) = x^{4/5} + x^{7/2}, \quad f_5(x) = \left(\frac{2}{5}\right)^x + x^{-2/3} + 9, \quad f_6(x) = x^4 + \log_2 x.$$

**Esercizio 2.** Prodotto di funzioni:

$$f_7(x) = 4x^2 \cos x, \quad f_8(x) = \ln x \operatorname{tg} x, \quad f_9(x) = 3^x \operatorname{sen} x,$$
$$f_{10}(x) = 5x e^x \operatorname{sen} x, \quad f_{11}(x) = 3x^2 \operatorname{arctg} x \cos x, \quad f_{12}(x) = -\sqrt{x} \operatorname{sen} x \ln x.$$

**Esercizio 3.** Quoziente di funzioni:

$$f_{13}(x) = \frac{1}{\cos x}, \quad f_{14}(x) = \frac{x^2}{\ln x}, \quad f_{15}(x) = \frac{\operatorname{sen} x}{1 + x^2}, \quad f_{16}(x) = \frac{5 - e^x}{e^x + 1}.$$

**Esercizio 4.** Funzioni razionali:

$$f_{17}(x) = \frac{2x + 1}{x - 5}, \quad f_{18}(x) = \frac{x + 7}{3x - 2}, \quad f_{19}(x) = \frac{1 - x}{x^2 + 2x + 3},$$
$$f_{20}(x) = \frac{2x^2 + x - 4}{x + 1}, \quad f_{21}(x) = \frac{2x^2 - 1 + x}{x^2 + 3}, \quad f_{22}(x) = \frac{2x}{x^3 + 2}.$$

**Esercizio 5.** Funzioni composte:

$$f_{23}(x) = (3x - 1)^2, \quad f_{24}(x) = \operatorname{sen}(2x + 3), \quad f_{25}(x) = e^{5x-1},$$
$$f_{26}(x) = \ln(1 + x^2), \quad f_{27}(x) = \frac{1}{\operatorname{sen}^2 x}, \quad f_{28}(x) = 2^{\operatorname{arctg} x},$$
$$f_{29}(x) = (\ln x)^2, \quad f_{30}(x) = (\operatorname{sen}(2x))^3, \quad f_{31}(x) = e^{\cos(1-3x)},$$
$$f_{32}(x) = \frac{\operatorname{sen}(2x + 1)}{1 + 3x^2}, \quad f_{33}(x) = 5 \operatorname{tg} \sqrt{x}, \quad f_{34}(x) = 5^{\frac{x-1}{x+1}},$$
$$f_{35}(x) = \frac{1}{\operatorname{arctg}(1 + 3x^4)}, \quad f_{36}(x) = \sqrt[3]{\ln(4 + \cos x)}, \quad f_{37}(x) = (x + e^{3x})^2.$$

**Esercizio 6.** Risolvere i seguenti limiti utilizzando i Teoremi dell'Hôpital:

$$\lim_{x \rightarrow 0} \frac{3x + 5 \operatorname{sen} x}{\operatorname{tg} x}, \quad \lim_{x \rightarrow 0^+} \frac{\cos(2x) - e^{3x}}{5x}, \quad \lim_{x \rightarrow 0} \frac{\operatorname{sen} x + \cos(3x) - e^x}{x^2},$$
$$\lim_{x \rightarrow 0} \frac{(1 + x)^{1/3} - (1 - x)^{3/4}}{1 - e^{5x}}, \quad \lim_{x \rightarrow 0} \frac{e^{4x} - 2 + e^{-x}}{\operatorname{sen}(5x)}, \quad \lim_{x \rightarrow 0} \frac{\operatorname{sen}(2x) - 3x^2}{4x^3 - \log(1 + x)},$$

$$\lim_{x \rightarrow 0} \frac{2e^{3x} - \sqrt{1+12x} - 1}{\operatorname{sen}^2 x}, \quad \lim_{x \rightarrow 0} \frac{\operatorname{sen}(x) - 7x}{x^2 \operatorname{sen} x}, \quad \lim_{x \rightarrow +\infty} \frac{x^{3/2} - 7x + 2}{\sqrt{x} + 2x^2 - 1},$$

$$\lim_{x \rightarrow +\infty} \frac{\log(1+3^x)}{\log(x^5+2)}, \quad \lim_{x \rightarrow +\infty} \frac{\sqrt[3]{x} + 2 \ln x}{e^x + 1}, \quad \lim_{x \rightarrow 0} \frac{\operatorname{tg}(5x) - xe^x}{\log(1+2x)},$$

$$\lim_{x \rightarrow 0} \frac{x - \operatorname{arcsen} x}{x^3}, \quad \lim_{x \rightarrow 0} \frac{2 \log(1+x) - 2x + x^2}{x^3}.$$