

# Esercizio n. 98

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Applicando le regole di derivazione calcolare la derivata prima delle seguenti funzioni trigonometriche e trigonometriche inverse:

1.  $f(x) = 5 \sin x + 3 \cos x$
2.  $f(x) = \tan x - \cot x$
3.  $f(x) = \frac{\sin x + \cos x}{\sin x - \cos x}$
4.  $f(t) = 2t \sin t - (t^2 - 2) \cos t$
5.  $s(t) = \arctan x + \operatorname{arccot} x$
6.  $f(x) = x \cot x$
7.  $f(x) = x \arcsin x$
8.  $f(x) = \frac{(1+x^2) \arctan x - x}{2}$

### Soluzioni

1.

$$f'(x) = 5 \cos x - 3 \sin x$$

2.

$$f'(x) = \frac{1}{\cos^2 x} + \frac{1}{\sin^2 x} = \frac{\sin^2 x + \cos^2 x}{\sin^2 x \cos^2 x} = \frac{4}{\sin^2 2x}$$

3.

$$\begin{aligned} f'(x) &= \frac{(\cos x - \sin x)(\sin x - \cos x) - (\cos x + \sin x)^2}{(\sin x - \cos x)^2} \\ &= -\frac{(\sin x - \cos x)^2 + (\cos x + \sin x)^2}{(\sin x - \cos x)^2} \\ &= -\frac{2}{(\sin x - \cos x)^2} \end{aligned}$$

4.

$$\begin{aligned} f'(t) &= 2 \sin t + 2t \cos t - 2t \cos t + (t^2 - 2) \sin t \\ &= t^2 \sin t \end{aligned}$$

5.

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

6.

$$\begin{aligned} f'(x) &= \cot x - \frac{x}{\sin^2 x} \\ &= \frac{\sin 2x - 2x}{2 \sin x} \end{aligned}$$

7.

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

8.

$$\begin{aligned} f'(x) &= \frac{2x \arctan x + 1 - 1}{2} \\ &= x \arctan x \end{aligned}$$