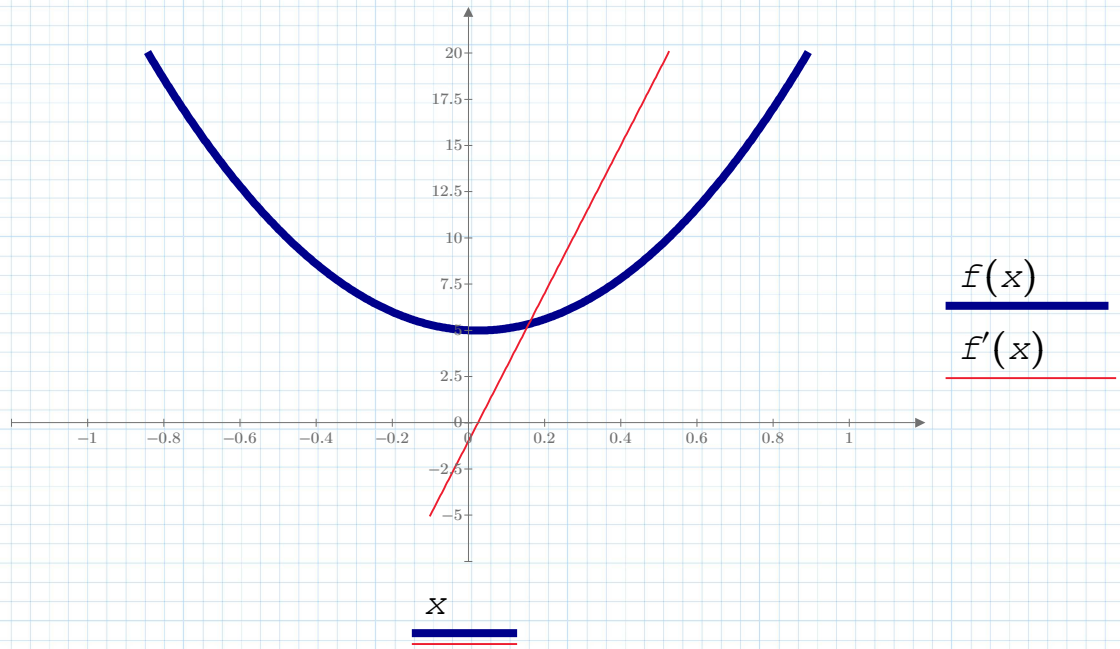
Differentiation Rules: examples

Example 1

$$f(x) := 2\ x^{100} + 50\ x^{93} + 20\ x^{2} - x + 5$$

$$f'(x) \rightarrow 200 \cdot x^{99} + 4650 \cdot x^{92} + 40 \cdot x - 1$$



$$f'(0.2) \rightarrow 7.0$$

$$f'(0.2) = 7$$

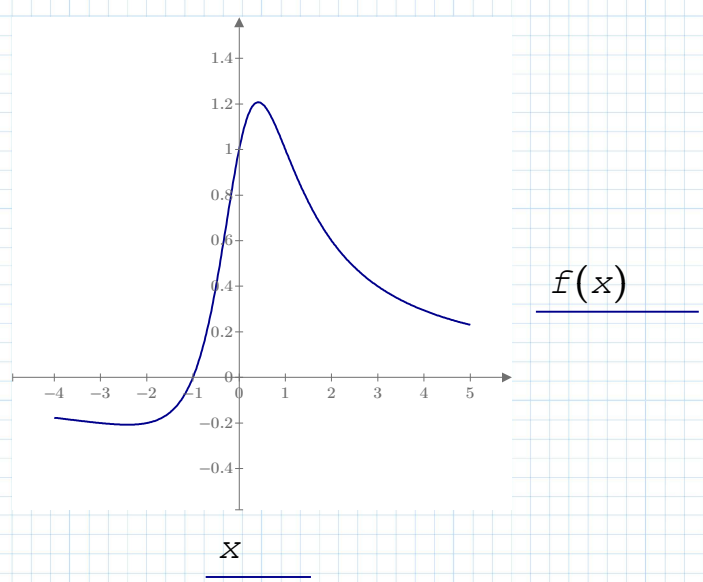
Example 2

$$f(x) := \frac{x+1}{1+x^{2}}$$

$$f'(x) \rightarrow \frac{1}{x^{2}+1} - \frac{2 \cdot x \cdot (x+1)}{\left(x^{2}+1\right)^{2}}$$

$$f'(0.2) \rightarrow 0.5177514792899408284$$

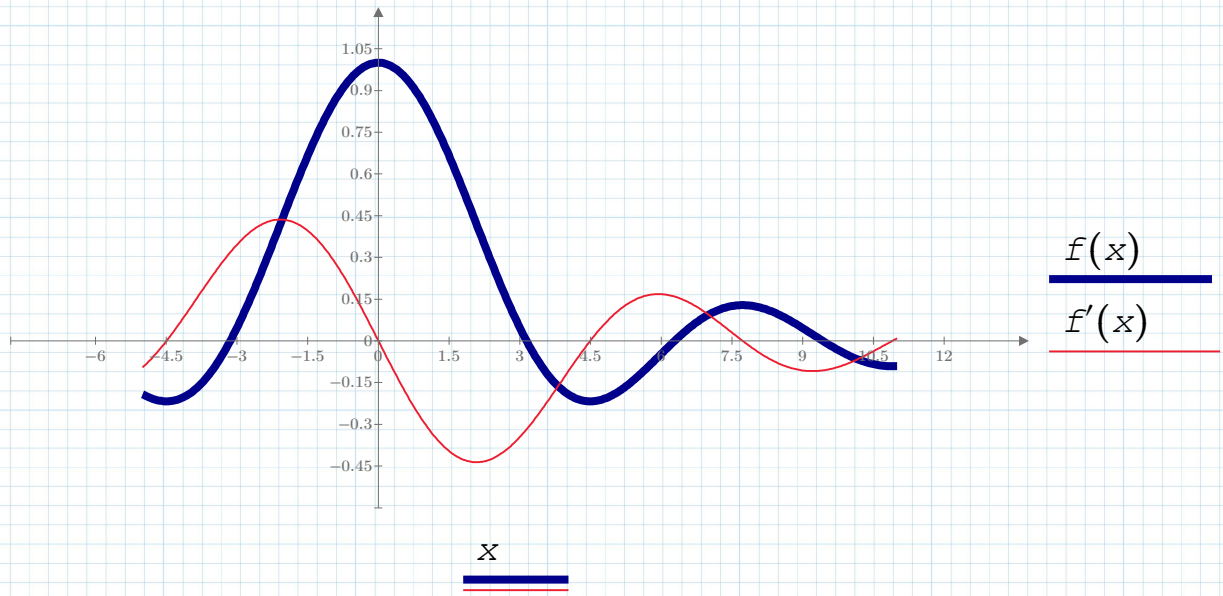
$$f'(0.2) = 0.518$$



Example 3

$$f(x) := \frac{\sin(x)}{x}$$

$$f'(x) \rightarrow \frac{\cos}{x} - \frac{\sin}{x^2}$$



Example 4

$$f(x) := \left(x^3 - x\right) \cdot \left(x^5 - x^2\right)$$

$$f'(x) \rightarrow \left(2 \cdot x - 5 \cdot x^4\right) \cdot \left(x - x^3\right) - \left(x^2 - x^5\right) \cdot \left(3 \cdot x^2 - 1\right)$$

References:

1. **G.Simmons.** Calculus With Analitic Geometry (1996): 3.1...3.4
2. **MIT** lection 14.02.2013
3. **MIT** exercises (unit1:1E, 1J)