

Differentiation examples

$$y = x^{10} \quad y' = 10 \cdot x^{10-1} = 10x^9$$

$$y = \sin x + 7x^2 \quad y' = \cos x + 7 \cdot 2x^{2-1} = \cos x + 14x$$

$$y = e^x \cdot \sin x \quad y' = e^x \cdot \frac{d}{dx}[\sin x] + \sin x \cdot \frac{d}{dx}[e^x]$$

$$= e^x \cdot \cos x + \sin x \cdot e^x$$

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

$$= -6x^{-3} \cos(3x^{-2})$$

$$y = \frac{10x^3}{2\sin x} \quad y = \frac{(2\sin x) \cdot \frac{d}{dx}[10x^3] - 10x^3 \cdot \frac{d}{dx}[2\sin x]}{(2\sin x)^2}$$

$$= \frac{2\sin x \cdot 10 \cdot 3x^2 - 10x^3 \cdot 2 \cdot \cos x}{(2\sin x)^2}$$

$$y = x^{1/2} - \log_{10}(2x)$$

$$y' = \frac{1}{2} x^{1/2-1} - \frac{1}{2x \cdot \ln 10} \cdot 2 \cdot 1$$

$$= \frac{1}{2} x^{-1/2} - \frac{1}{x \ln 10}$$

$$= \frac{1}{2\sqrt{x}} - \frac{1}{x \ln 10}$$

$$x^{1/2} = \sqrt{x}$$

$$x^{-1/2} = \frac{1}{\sqrt{x}}$$

$$c' = 0$$

$$x' = 1$$

$$(cf)' = c \cdot f'$$

$$\rightarrow (x^n)' = nx^{n-1}$$

$$\rightarrow (fg)' = f \cdot g' + g \cdot f'$$

$$\rightarrow \left(\frac{f}{g}\right)' = \frac{g \cdot f' - f \cdot g'}{g^2}$$

$$(f(g))' = f'(g) \cdot g'$$