

Exercise 0.1: Compute the derivative of the following function:

$$f(x) = \sin((\sin x)^2)$$

Solution on page 2

Exercise 0.2: It holds:

$$\frac{d}{dx} (\ln |x|) = \frac{1}{x}.$$

Exercise 0.3: Compute the derivative of the following function:

$$f(x) = (\sin(\sin x))^2$$

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Exercise 0.4: Compute the derivative of the following function:

$$f(x) = \sqrt{x^3 - 6x^2 + 2x}$$

Solution on page 2

Exercise 0.5: Compute the derivative of the following function:

$$f(x) = \left(\frac{2 + 3x}{1 - 2x} \right)^3$$

Solution on page 2

Exercise 0.6: Compute the derivative of the following function:

$$f(x) = \frac{\cos x}{(\tan 2x)^2}$$

Solution on page 2

Exercise 0.7: Compute the derivative of the following function:

$$f(x) = \cos((2x^2 + 3)^3)$$

Solution on page 2

Exercise 0.8: Compute the derivative of the following function:

$$f(x) = (x^2 + 1)\sqrt{x^4 + 1}$$

Solution on page 2

Solution of Exercise 0.1 on page 1:

The derivative is:

$$f'(x) = (\sin((\sin x)^2))' = \cos((\sin x)^2) 2 \sin x \cos x.$$

Solution of Exercise 0.3 on page 1:

The derivative is:

$$f'(x) = ((\sin(\sin x))^2)' = 2 \sin(\sin x) \cos(\sin x) \cos x.$$

Solution of Exercise 0.4 on page 1:

The derivative is:

$$f'(x) = (\sqrt{x^3 - 6x^2 + 2x})' = \frac{3x^2 - 12x + 2}{2\sqrt{x^3 - 6x^2 + 2x}}.$$

Solution of Exercise 0.5 on page 1:

The derivative is:

$$f'(x) = \left(\left(\frac{2+3x}{1-2x} \right)^3 \right)' = 3 \left(\frac{2+3x}{1-2x} \right)^2 \frac{(1-2x)3 - (2+3x)(-2)}{(1-2x)^2} = \frac{21(2+3x)^2}{(1-2x)^4}.$$

Solution of Exercise 0.6 on page 1:

The derivative is:

$$\begin{aligned} f'(x) &= \left(\frac{\cos x}{(\tan 2x)^2} \right)' = \left(\frac{\cos x (\cos 2x)^2}{(\sin 2x)^2} \right)' \\ &= \frac{(\sin 2x)^2 [(-\sin x)(\cos 2x)^2 + (\cos x)4 \cos 2x(-\sin 2x)] - \cos x (\cos 2x)^2 4 \sin 2x \cos 2x}{(\sin 2x)^4} \\ &= -\frac{\cos(2x)[\sin x \sin 2x \cos 2x + 4 \cos x (\sin 2x)^2 + 4 \cos x (\cos 2x)^2]}{(\sin 2x)^3} \\ &= -\frac{\cos(2x)[\sin x \sin 2x \cos 2x + 4 \cos x]}{(\sin 2x)^3}. \end{aligned}$$

Solution of Exercise 0.7 on page 1:

The derivative is:

$$\begin{aligned} f'(x) &= (\cos((2x^2 + 3)^3))' = -\sin((2x^2 + 3)^3) 3(2x^2 + 3)^2 2 \cdot 2x \\ &= -12x(2x^2 + 3)^2 \sin((2x^2 + 3)^3). \end{aligned}$$

Solution of Exercise 0.8 on page 1:

The derivative is:

$$f'(x) = ((x^2 + 1)\sqrt{x^4 + 1})' = 2x\sqrt{x^4 + 1} + \frac{2x^3(x^2 + 1)}{\sqrt{x^4 + 1}}.$$