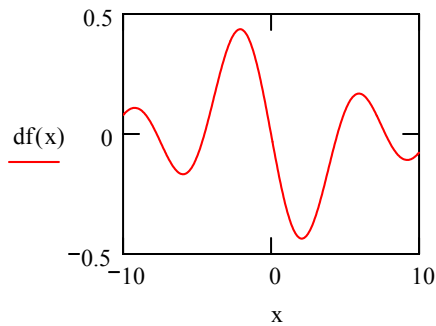
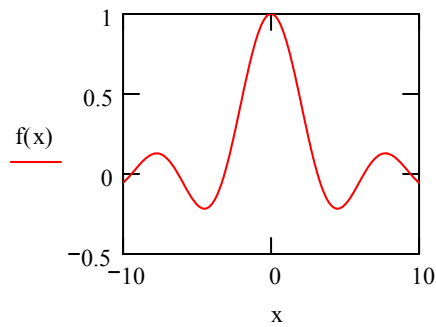


Function, Derivative, and L'Hopital Rule Example

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

$$df(x) := \frac{\cos(x)}{x} - \frac{\sin(x)}{x^2} \quad \text{derivative}$$

$$x := -10, -9.95 \dots 10$$



Evaluations:

$$f(0) = 1$$

$$df(-0.001) = 3.333 \times 10^{-4} \quad df(0.001) = -3.333 \times 10^{-4}$$

$$df(0) = \blacksquare \quad \text{need to use l'Hopital rule to evaluate}$$

$$\lim_{x \rightarrow 0} \left(\frac{\cos(x)}{x} - \frac{\sin(x)}{x^2} \right) = \lim_{x \rightarrow 0} \frac{(\cos(x) \cdot x - \sin(x))}{x^2} = \lim_{x \rightarrow 0} \frac{-\sin(x) \cdot x}{2 \cdot x} = \lim_{x \rightarrow 0} \frac{-\cos(x) \cdot x - \sin(x)}{2}$$

or have MathCAD evaluate the limit Symbolically

$$\underline{\ln(x)} = 0$$