

4.1 Extreme Values of Functions

Extreme Values (Maximums and Minimums)

Occur at: 1. Critical Points OR 2. Endpoints

Critical Points

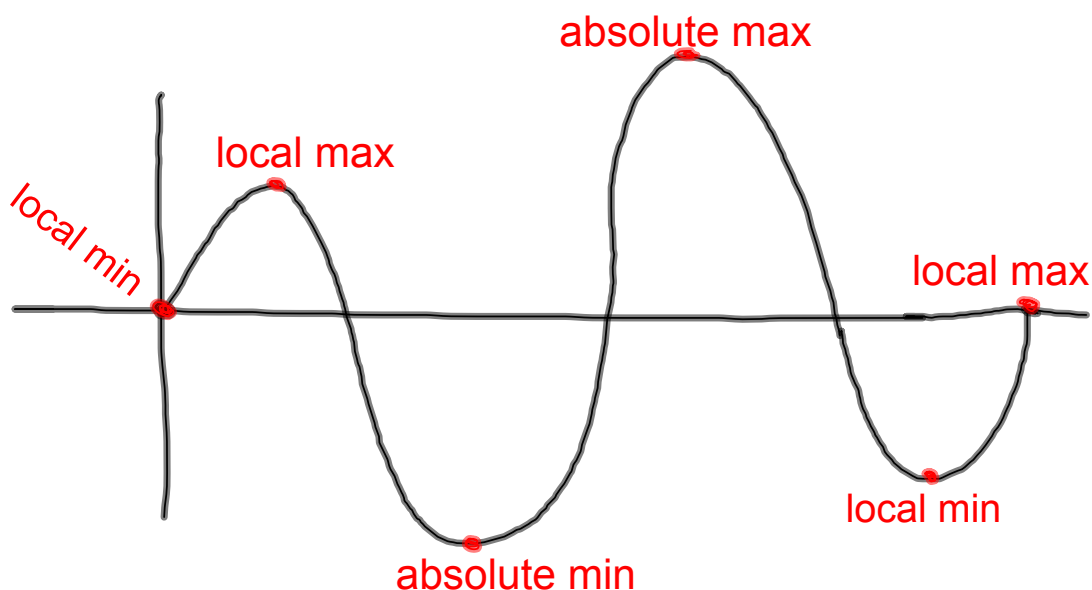
1. $f'(x) = 0$
2. $f'(x) = \text{undefined}$
3. Endpoints (May or may not exist)

Absolute Extrema

Highest / Lowest
on entire graph

Local Extrema

Highest / Lowest
compared to points on
each side



Ex 1) $y = x^2 + 1$

$$-2 \leq x \leq 2$$

Find the maximum and minimum values of the function.

$$y = x^2 + 1$$

What is the minimum value? (y-value)

Where does the minimum occur? (x-value)

$$\text{Ex 2) } y = e^{-x} \quad \boxed{-1 \leq x \leq 1}$$

Find the maximum and minimum values of the function.

$$\text{Ex 3) } y = \sqrt{4 - x^2}$$

Find the maximum and minimum values of the function.

Ex 4) $y = \sec x$

$$\frac{-\pi}{2} \leq x \leq \frac{3\pi}{2}$$

Find the maximum and minimum values of the function.