

Worksheet #18: Finding Absolute Maxima and Minima

Critical number:

A critical number is a number c in the domain of f where:

$$f'(c) = 0 \quad \text{or where} \quad f'(c) = \text{does not exist}$$

Basic Guidelines: Absolute Extrema are functional values, y-values.

On Closed Intervals $[a, b]$:

Step 1: Find all the critical numbers (places where either the derivative is zero or it doesn't exist).

Step 2: Substitute each of the critical numbers and the end points into $f(x)$ to find the function values.

* The smallest is the Absolute Minimum, *whereas* the largest is the Absolute Maximum.

Find all the critical numbers for the following functions:

1. $f(x) = (x^2 - 1)^5$

2. $f(x) = \sqrt[4]{x^3}$

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

4. $f(x) = \frac{x-1}{x^2}$

Find the Absolute Maxima and Absolute Minima for the following:

5. $f(x) = (x-1)^3; [0,3]$

6. $f(x) = 2x^3 + 3x^2 - 12x + 1; [0,3]$

7. $f(x) = x^3 - 6x^2 + 7; \text{ on } [2,6]$