Entry #: ______

Lesson 5.1: Absolute Extrema and the Mean Value Theorem

Vocabulary

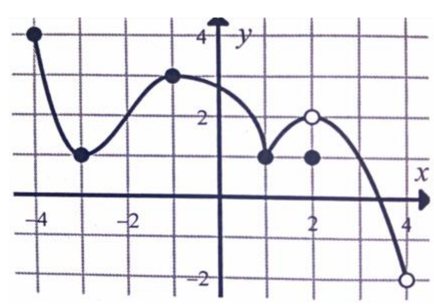
Absolute Maximum (Global Maximum)	
Absolute Minimum (Global Minimum)	
Relative Maximum (Local Maximum)	
Relative Minimum (Local Minimum)	
Extrema (Extreme Values)	
Critical Numbers	

The Candidate Test: The Procedure for Finding Absolute (Global) Extrema

Note: Absolute extrema can occur either at critical numbers or endpoints. Relative extrema can occur only at ______________________ . We will not consider endpoint extrema to be relative extrema.

Examples: Use the figure of $y = f(x)$ at the right to answer these questions

1. What is the absolute max of f?
2. At what $x - values$ does f have an absolute maximum?
3. What is the absolute maximum point on f?
4. What is the absolute minimum of f?
5. At what $x - values$ does f have a relative minimum?
6. At what $x - values$ does f have a relative maximum?



Examples:

1. Find the global extrema of $f(x) = \frac{1}{3}x^3 - 2x^2$ on the interval $[-1,3]$.

2. Find the absolute maximum and absolute minimum values of $f(x) = |x - 2|$ on the interval $[0,5]$.

3. Find the extrema of $f(x) = 3x^{\frac{2}{3}} - 2x$ on $[-1,3]$.

4. Find the global maximum and minimum of $g(x) = 2\sin(x) - \cos(2x)$ on the interval $[0,2\pi]$.

The Mean Value Theorem

If f is continuous on $[a, b]$ and differentiable on (a, b), then there is a number c in (a, b) such that:

Informally, The Mean Value Theorem states that given the right conditions of _______________ and _____________________ , there will be at least one tangent line parallel to the secant line.

The instantaneous rate of change (slope of tangent) will equal the average rate of change (slope of secant) at least once.

Example: Given $f(x) = 3 - \frac{6}{x}$, find all c which satisfy the Mean Value Theorem on the interval $[3,6]$.