Extrema on an Interval … Set 1

Critical Points

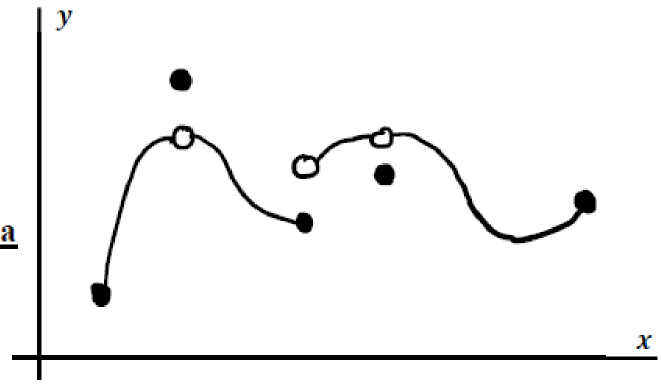
Extreme Value Theorem:

If a function f is continuous over the interval $[a, b]$, then f has at least one minimum value and at least one maximum value on $[a, b]$.

Global vs. Local Extrema

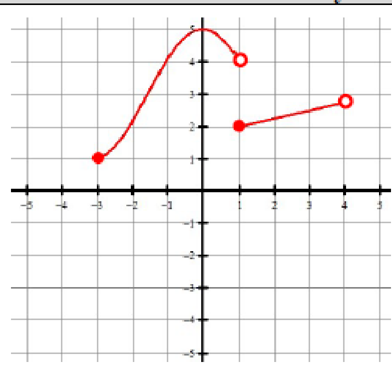
or

Absolute vs. Relative Extrema

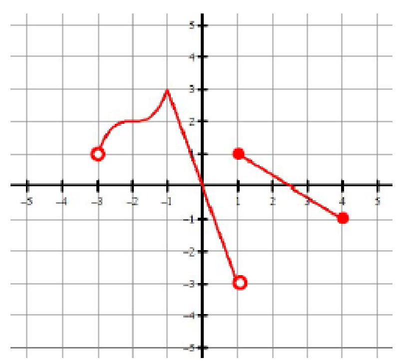


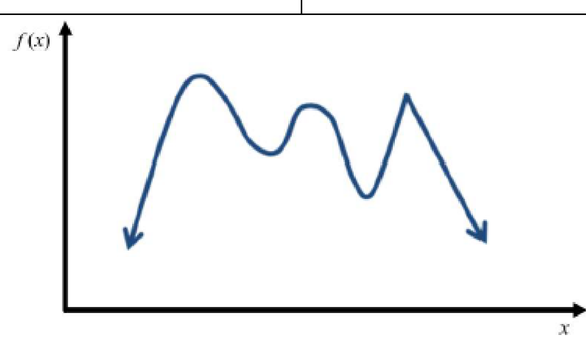
Find all extreme values. Identify the type and where they occur.

1.



2.





Extrema on an Interval … Set 1

Critical Point:

How do you find a critical point?

1.
2.

Find all critical points	
3. $f(x) = \frac{1}{3}x^3 - 9x + 24$	4. $g(x) = \frac{1}{\sqrt{4-x^2}}$

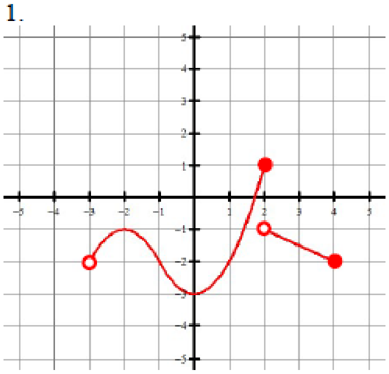
5.2 Critical Points

Calculus

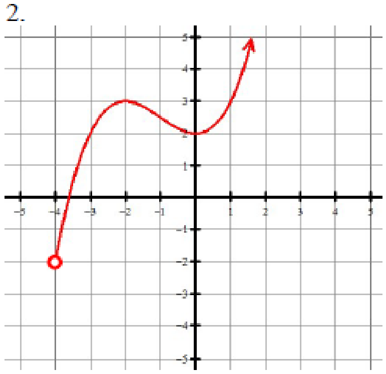
Practice

Find all extreme values. Identify the type and where they occur. For example, an answer could be written as "absolute max of 3 at $x = 1$."

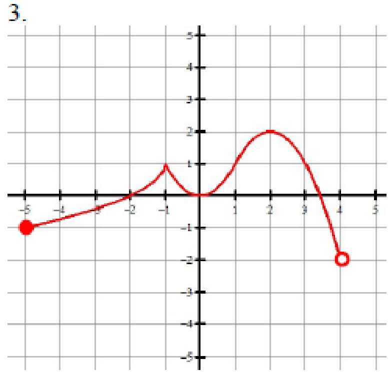
1.



2.



3.



Extrema on an Interval … Set 1

Find the critical points.		
4. $f(x) = 4x^3 - 9x^2 - 12x + 3$	5. $g(t) = \frac{2}{t^2-4}$	6. $h(x) = \sqrt[3]{x-2}$
7. $f(x) = (\ln x)^2$	8. $h(x) = 2\sin\left(\frac{x}{2}\right)$ where $-2\pi \le x \le 2\pi$	9. $g(x) = e^x - x$

Extrema on an Interval … Set 1

Critical Points

10. **Calculator active problem.** The first derivative of the function f is given by $f'(x) = \frac{\sin^2 x}{x} - \frac{2}{9}$. How many critical values does f have on the open interval $(0, 10)$?

A) One (B) Two (C) Three (D) Four (E) Six

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11. If f is a continuous, decreasing function on $[0,10]$ with a critical point at $(4, 2)$, which of the following statements must be false?
    (A) $f(10)$ is an absolute minimum of f on $[0,10]$.
    (B) $f(4)$ is neither a relative maximum nor a relative minimum.
    (C) $f'(4)$ does not exist
    (D) $f'(4) = 0$
    (E) $f'(4) < 0$