Section 5.5: Absolute Maxima and Minima

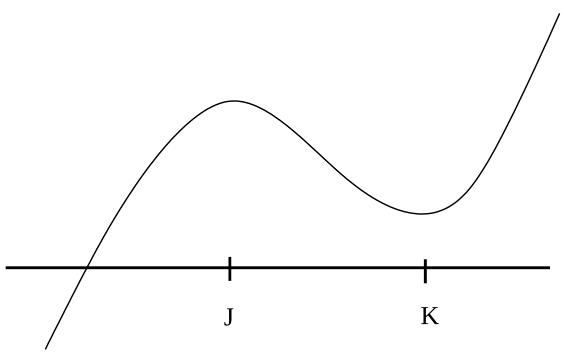
Example: For the function $f(x) = x^2 - 2x - 3$, find and classify the critical values.

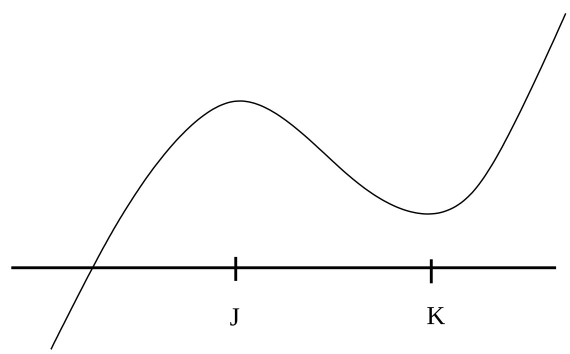
Definition: If $f(c) \geq f(x)$ for x is the domain of f, then $f(c)$ is called the **absolute maximum value**(absolute max) of $f(x)$.
If $f(c) \leq f(x)$ for x is the domain of f, then $f(c)$ is called the **absolute minimum value**(absolute min) of $f(x)$.

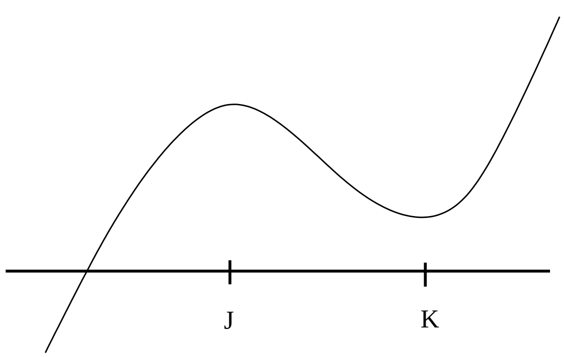
Example: For these functions, find the absolute max and the absolute min.
A) $y = 3x^2 - x^3 + 1$

B) $y = x^4 - 4x^3$

Restricted Domains:







Definition: If $f(x)$ is a continuous function on a closed interval, $[a, b]$, then $f(x)$ will have both an absolute max and an absolute min. They will happen at either critical values in the interval or at the ends of the interval, $x = a$ or $x = b$.

Example: For the function, find the absolute max and the absolute min on the indicated interval.

$f(x) = 12x^2 - 3x^3 + 1$

A) $[2, 5]$
B) $[-3, 5]$
C) $(-3, 5)$

Example: For the function, find the absolute max and the absolute min on the indicated interval.

$f(x) = \dfrac{3}{x^2 - 1}$

A) $[2, 5]$
B) $[0, 5]$

Example: For the function, find the absolute max and the absolute min on the indicated interval.

$f(x) = x + \dfrac{16}{x}$, $(0, \infty)$

Example: If $f'(x) = 6x - 12$, and the function $f(x)$ has critical values of $x = 1$, and $x = 3$. What can be said about the critical values.

Second Derivative Test Suppose that $x = c$ is a critical values for $f(x)$.

Example: If $g''(7) = 8$, what conclusion can be made for $g(x)$ at $x = 7$?