5.2-Maxima and Minima

Definitions:
f has a *relative maximum* at $x = a$ if and only if

f has a *relative minimum* at $x = a$ if and only if

Fermat's Theorem: If f has a relative maximum or relative minimum at $x = a$ and f is differentiable at $x = a$, then

More definitions:

f has a critical value at $x = a$ if and only if

f has an *absolute maximum* at $x = a$ if and only if

f has an *absolute minimum* at $x = a$ if and only if

Extreme Value Theorem If f is continuous on a closed, bounded interval, then

Graphical examples to show that each of the conditions must hold to guarantee the conclusion:

Examples:

Find the absolute maximum and absolute minimum of $f(x) = \sqrt{6x - x^2}$

Find the absolute maximum and absolute minimum of $f(x) = x^2 e^{-x}$ on the interval $[1, 4]$

On Your Own: #3, 7, 11, 17, 19, 25, 27, 31, 37, 39, 41, 43, 45