	AP CALCULUS	
3	Topic: 5.2	Extreme Value Theorem, Global Versus Local Extrema, and Critical Points
Learning Objective FUN-1.C: Justify conclusions about functions by applying the Extreme Value Theorem		

The Extreme Value Theorem

If f is continuous on a closed interval $[a, b]$, then f has BOTH a maximum and a minimum on the interval.

Definition of Critical Numbers

Let f be defined at c. If $f'(c) = 0$ or if f is not differentiable at c, then c is a **critical number** of f.

Definition of Relative Extrema

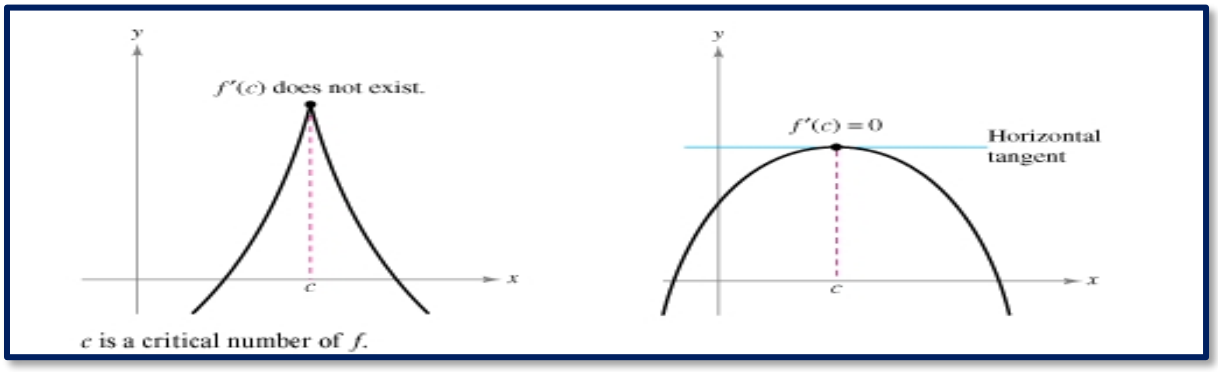
Let f be a function whose second derivative exists on an open interval I.

1. If there is an open interval containing c on which $f(c)$ is a maximum, then $f(c)$ is called a **relative maximum** of f.

2. If there is an open interval containing c on which $f(c)$ is a minimum, then $f(c)$ is called a **relative minimum** of f.

The plural of relative maximum is relative maxima, and the plural of relative minimum is relative minima.

Below are two examples of a critical number, c of function f.



Relative Extrema Occur Only at Critical Numbers

If f has a relative minimum or relative maximum at $x = c$, then c is a critical number of f.