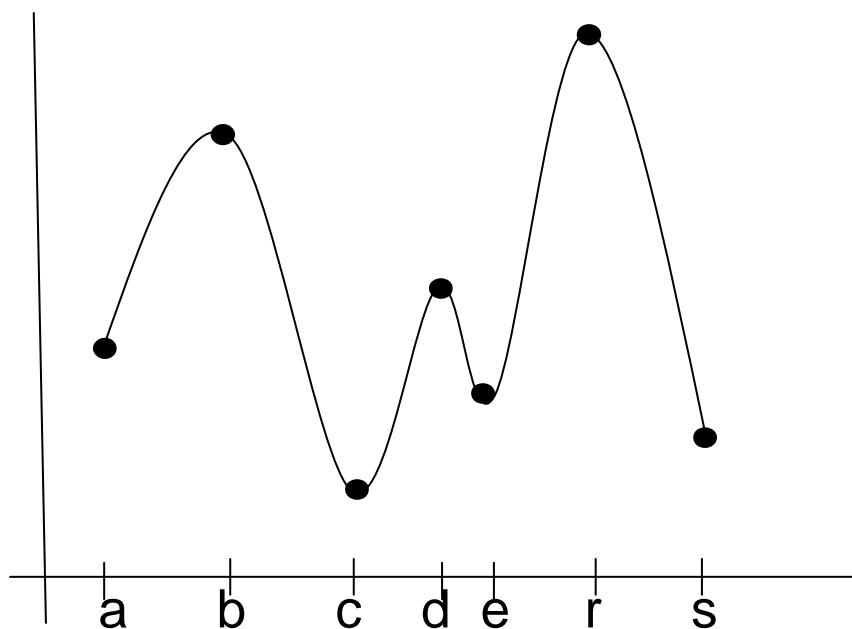


# Calculus BC

## Section 3.1 - Extrema on an Interval

Obj: - To use the derivative to locate the minimum and maximum values of a function on a closed interval.



relative min:

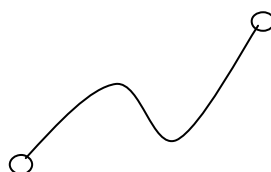
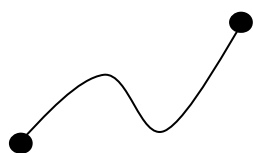
relative max:

absolute (global) min:

absolute (global) max:

### The Extreme Value Theorem

If  $f(x)$  is continuous on  $[a, b]$ , then  $f$  has both a minimum and a maximum.



What do you notice about the derivative (slope) at relative extrema?

### Definition

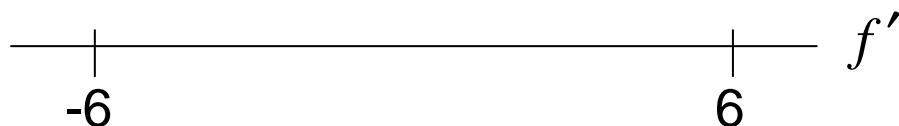
$c$  is a **critical value** of  $f(x)$  if  $f'(c) = 0$

1. Find the extrema of  $f(x) = x^3 + 6x^2 - 15x + 2$  on the interval  $[-6, 6]$ .

-find \_\_\_\_\_

- set \_\_\_\_\_ to \_\_\_\_

-solve to find critical numbers



Test values in each interval to determine sign of  $f'(x)$

$x =$

$x =$

$x =$

Max at  $x =$

Min at  $x =$

2. Find the extrema to  $f(x) = x^3$

$$f'(x) =$$

-find \_\_\_\_\_

- set \_\_\_\_\_ to \_\_\_\_

-solve to find critical numbers

\_\_\_\_\_  $f'$

3. Find the extrema to  $f(x) = \sqrt{x} + 3x$