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Day 25 is Tuesday, October 23, 2012

Continuing Section 5-5 Absolute Extrema

The Closed Interval Method

This method is used for

Finding Absolute Max + Absolute Min
in the special situation where
the domain is a closed interval $[a, b]$
and the function f is known to be
continuous on the domain.

Identify all important x -values (make a list)

- endpoints of the domain
- critical values, that are in the domain.

Then find the corresponding y -values.

The ~~largest~~ greatest y -value on the list is the abs. max.

The smallest y -value on the list is the abs. min.

Example $f(x) = x^4 - 6x^2 + 5$

Find all absolute extrema on the interval $[-3, 2]$

Solution

Observe: the domain $[-3, 2]$ is a closed interval.

The function f is continuous on the domain
(because f is a polynomial)

So we can use the Closed Interval Method.

Identify Important x-values

Endpoints $x = -3$, $x = 2$.

Find Critical Values.

Find partition numbers for $f'(x)$

$$f'(x) = 4x^3 - 6(2x) + 0 = 4x^3 - 12x$$

We see that f' is polynomial, so f' always exists.

The only possible partition numbers will be

$$\text{from } f'(x) = 0$$

So set $f'(x) = 0$ and solve for x .

