Function & Graph Analysis

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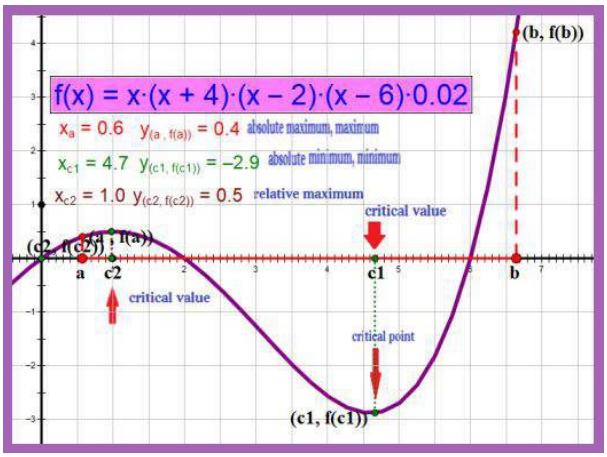
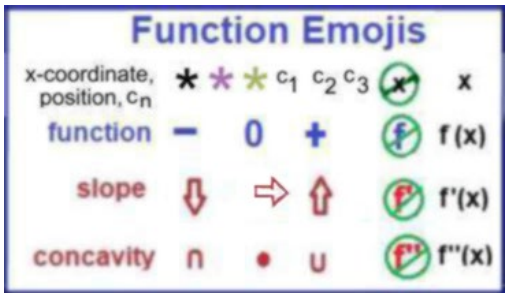
Vocabulary & Symbols





Function Emojis

In question & answer form

① Is the extreme value an x-value or a y-value? y-value

② the x-value used to find an extreme value is usually symbolized with what letter? c

③ State all the kinds of extreme values there are. and a symbol one might use for an extreme value.

a) absolute max $f(c)$ c) relative max $f(c)$

b) absolute min $f(c)$ d) relative min $f(c)$

I = interval $[a,b]$ closed & includes a & b

(a,b) open & a,b are not included

f = function

c is x-value of an extreme value, $f(c)$

c is a x-value in the interval $[a,b]$

c is called a critical value ← x-value

c is called a critical number ← x-value

$(c, f(c))$ is called a critical point

c the critical number, critical value, that gives one $f(c)$

$f(c)$ the extreme value ones gets using c for x

c is an x-value where $f'(c) = 0$ or $f'(c)$ is undefined

Precalc & Pre-Precalc Function Graphing

- Function Vocabulary
- How to Graph a Function
- Graphs of Precalc Functions
- Polynomial Functions
- Quick polynomial function sketch
- Rational Functions
- Calc I Function & Graph Analysis -- this page
- Function Emojis

What the Derivatives Indicate

x- an instant in time or a number on the interval [a, b]

f(x) -the value of the FUNCTION at this intant

f'(x) - how the value of the FUNCTION IS CHANGING at this instant

if positive, f'(x) > 0, the function value is growing, increasing ⇧

if negative, f'(x) < 0, the function value is decreasing ⇩

if f'(x) = 0, the function value is not changing ⇔

the function value is not growing and it is not decreasing

- THIS IS THE SLOPE

f''(x) - how the value of the CHANGE IN THE CHANGE is changing at this instant

if positive, f''(x) > 0, the function value is CONCAVE UP, the function was decreasing but now it is growing ∪

if negative, f''(x) < 0, the function value is CONCAVE DOWN, the function was increasing but now it is decreasing ∩

if f''(x) = 0, the function value is not changing

the function value is not growing and it is not decreasing •

- THIS IS THE CONCAVITY

Uses: Determine/find maximums and minimums,
Use Derivatives to Predict the Future

I. Determine/find maximums and minimums.

(Find extrema, the max & minimum y-values.)

1st: (Just so you don't forget to check function values for endpoints a and b.)

Compute f(a) and f(b).

2nd: Find the critical numbers.

a. Compute f'(x).

b. Set f'(x) = 0.

c. Solve to find c_1, c_2, ..., c_n

d. Organize your result in a table.

3rd: Find possible max & min values.

a. Compute and list $f(c_1)$, $f(c_2)$, ..., $f(c_n)$.

b. Scan the f(x) values for the maximum and minumum.

x	f(x)
a	f(a)
c_1	$f(c_1)$
c_2	$f(c_2)$
⋮	⋮
c_n	$f(c_n)$
b	f(b)

then identify the max & min in the f(x) list.

II. Predict the future

The value of x or t states the now, the current time or number.

The f(x) or f(t) states the status at the current time or number.

The f'(x) or f'(t) states how thing are going, the rate of change, positive (increasing), negative (decreasing), or 0 (no change at the moment).

The f''(x) or f''(t) states how the change is changing, is the present and future "looking up," (concave up), or at this instant and in the future are things "looking not as positive," (concave down), or things might be changing from "looking up" to "looking down." or from "looking not so positve" to "looking up," because there is pause, 0 change in the change, at this instant.

The F(x) or F(t) states the overall effect of f(x) or f(t) either as a function or over the interval [a, b] as a number. F(x) is called the antiderivative of f(x).

Again, x states now,
f(x), the function value, states the current status,
f'(x), the first derivative, states how thing are changing,
f''(x), the second derivative, states how thing are in general and how the change is changing.
The F(x) or F(t) states the overall effect of f(x) or f(t).

Tools

- Mean.Rolle.f(x).f''(x).gsp - - interval, critical values, maximums, minimums, function emoji, Mean Value and Roll's Theorems, derivative tests,

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