

CARTOON CONVERSATIONS

Cartoon Conversations is an excellent strategy to promote deeper and broader thinking from your students.

Intermediate Value Theorem

pg 77

The Extreme Value Theorem

pg 164

Definition of the Derivative of a function

pg 99

The Mean Value Theorem & Rolle's Theorem

pg 174 & 172

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If f is continuous on the closed interval $[a, b]$ and K is any number between $f(a)$ and $f(b)$, then there is at least one number c in $[a, b]$ such that $f(c) = K$.

I'm the king of finding instantaneous slopes. Derivatives are all about slopes.

Let f be defined on an interval I containing c .
1) $f(c)$ is the minimum of f on I if $f(c) \leq f(x)$ for all x in I .
2) $f(c)$ is the maximum of f on I if $f(c) \geq f(x)$ for all x in I .

The minimum and maximum of a function on an interval are the extreme values, or extrema, of the function on the interval. The minimum and maximum of a function on an interval are also called the absolute minimum and absolute maximum on the interval.

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

Dude, I'm here to fill in for the Intermediate Value Theorem class on the I.V.T. It wants everyone to know that he needs to be a continuous function.

Dude, I know, I'm talking about Rolle's Theorem and the special case of the Mean Value Theorem. Anyways, Rolle said to say the same thing. HE MUST BE CONTINUOUS!

Dude, I'm special. I'm better than just that normal old Mean Value Theorem, Rolle's Theorem. ONLY happens when the two points have the same y-coordinate, making at least one point a slope of zero between the two end points. I'm so special.

Alright, apparently I'm here on behalf of the great Definition of Derivative Man. He said to tell the Extreme Value Theorem that he can utilize the magical powers of derivatives to assist in finding minimums and maximums. Unfortunately, this won't work if both of the absolute extrema on the interval are endpoints without a slope of zero.

The derivative of f at x is given by

$$f'(x) = \lim_{\Delta x \rightarrow 0} \frac{f(x+\Delta x) - f(x)}{\Delta x}$$

provided the limit exists. For all x for which this limit exists, f' is a function of x .

The Mean Value Theorem also deals with slopes. And derivatives. Strange.

MVT: If f is continuous on the closed interval $[a, b]$ and differentiable on the open interval (a, b) , then there exists a number c in (a, b) such that:

$$f'(c) = \frac{f(b) - f(a)}{b - a}$$

Rolle's Theorem:
Let f be continuous on the closed interval $[a, b]$ and differentiable on the open interval (a, b) . If $f(a) = f(b)$ then there is at least one number c in (a, b) such that $f'(c) = 0$.

You know, I have been wondering where all of these special calculus people have gone. I should be explaining this stuff. Oh well, at least I know that derivatives can help me in my extreme journey.

Personally, I think the Mean Value Theorem is better because I can be used for many more slopes, not just zero.