MiT Single Variable Calculus, Fall 2010
Pending Questions

Fakhir

November 10, 2017

https://ocw.mit.edu/courses/mathematics/18-01sc-single-variable-calculus-fall-2010/

Questions that I had in my mind while doing this course:

1 Differentiation

1.1 Session 1, 2

1. How do we cut a cone using a plane so that it gives us the hyperbola $1/x$ (because this particular curve has a weird skewed shape. Pretty hard to imagine the resulting cross-section unless the cones are themselves skewed somehow.)

2. The "difference quotient" formula for differentiation has delta x or dx in the denominator where $dx \to 0$. We can't just put dx to 0 "INITIALLY" because that will give us $0/0$. But after simplifying the formula (and some cancellations), as a very last step we plug 0 to dx and everything works out magically ! So What is happening here? Is the simplification process changing anything? (even though it shouldn't)

1.2 Session 3

1. The geometric interpretation of derivative is that its the "slope of a line". Are there any other interpretations? Yes:

   (a) Rate of change (average change)

   (b) ...

2. Stupid question: Why do we study limits in "calculus"? Shouldn't this be a part of say functions or real analysis or something?

3. Is the "limit" a "linear operator"? i.e:

$$\lim_{x\to\infty}(f(x)+g(x)) = \lim_{x\to\infty} f(x) + \lim_{x\to\infty} g(x)$$