Math 199, Spring 2022
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1/21/22

Preparation Assignment 1 - Understanding integrals

Estimated Time: Less than 1 hour.

Goals: The main goal of this assignment and this Friday's class will be to understand how the integral works, and why it is helpful for computing difficult quantities. We'll use this video by 3blue1brown in his "Essence of calculus" series to help give our minds a starting place (read on before you click):

Get out a piece of paper (or virtual tablet paper), and follow these steps in order.
Reminder: your preparation grade will only be based on your attempting this assignment in full, but giving it more time will obviously benefit you more.

1) Before watching the video, write down a precise definition of the definite integral, ideally in a way you can understand. (If you need to look at your calculus 1 materials or the internet to get this right, do that. My use of the word "precise" will generally mean correctness is important.)

2) In your own words, what does the definite integral do?

3) If you used the word "area" anywhere in (2), can you try again without using that word?
If you did not use the word "area" in (2), try to explain why some people might use that word, and how that fits in to your answer to (2).

4) What is an indefinite integral? How is it different from the definite integral?
Bonus: Why do I use the word "an" before indefinite integral and "the" before definite integral?
Bonus: How do indefinite integrals relate to definite integrals?

Watch until time 2:30 of this video.

5) Try to compute the area of the circle from this starting point, using an integral, without watching further.

6) Without doing a calculation, think about and explain how you would do the same thing as in (5), but using the slicing pattern of the circle at times 2:06 and 2:14.

Continue watching the video until time 7:13.

7) Try to answer his question. Try to write down a general way to use integrals to compute quantities using the idea put forth by his example.

Continue watching the video until time 11:34.

8) His last idea before I asked you to stop will be one of our guiding principles in Math 199. To solve difficult problems, it's good to play around with the surrounding ideas. Try doing this. Report here some things you learned by playing around and/or from working through this assignment.

Bonus: Watch the rest of the video if you have time.