MTH 252 Lab
Areas

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Purpose

A lot was introduced in this section that seems irrelevant, but they are the building blocks of the rest of calculus. Sigma notation is meant to simplify and condense a long computation. Areas will be used to establish an application for antiderivatives. And combining the two will create lots of cool stuff very soon!

(a) What does each of i, n, and a_i represent in the expression $\displaystyle\sum_{i=1}^{n} a_i$?

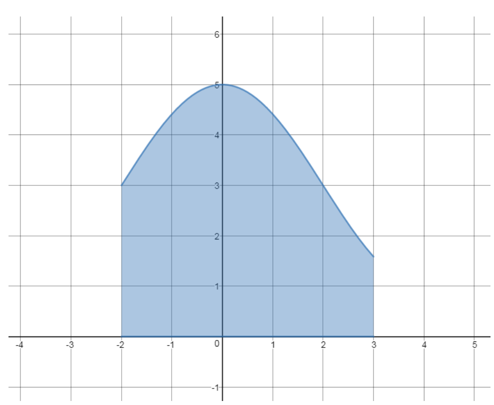
(b) What does L_n and R_n represent? Given the graph of a continuous function, can you draw what L_n and R_n would represent?

(c) What is Δx? As n increases, what happens to Δx?

(d) What is the difference between $\displaystyle\sum_{i=1}^{n} f(x_i^*)\Delta x$ and $\displaystyle\lim_{n\to\infty}\sum_{i=1}^{n} f(x_i^*)\Delta x$?

Prompts

1. The graph of $f(x) = 2\cos\left(\frac{\pi}{4}x\right) + 3$ where $-2 \le x \le 3$ is graphed below.



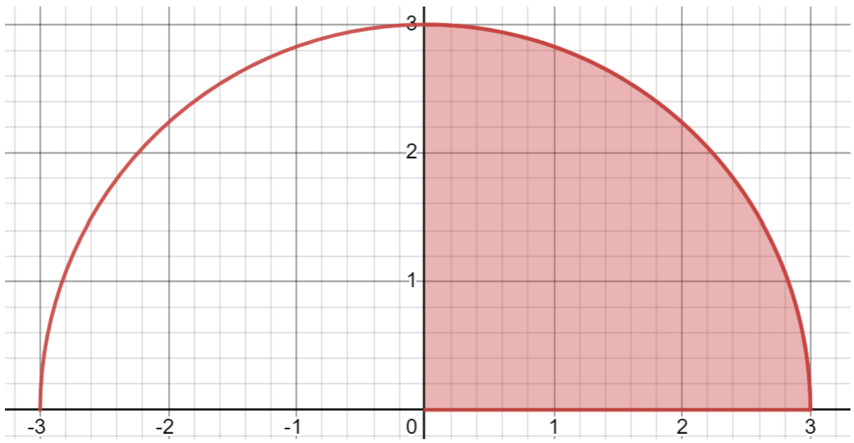
Copy the graph of f onto your lab. Approximate the area of the highlighted region using R_5, and draw an interpretation of R_5 on your graph. Use exact values – do not round!

2. Speedometer readings every five seconds of a car are given below:

Time (s)	0	5	10	15	20	25	30
Velocity (mph)	17	21	24	29	32	31	28

About how many feet did the car travel in these 30 seconds? Use an approximation method similar to what we covered in class to obtain your conclusion. *This is not a trivial problem. Be aware of the units.*

3. A semicircle is graphed below with a region highlighted.



(a) Write down a function $f(x)$ for the graph of the semicircle. Use this function to complete the next part.

(b) Use L_6 to approximate the area of the highlighted region. Round your conclusion to the nearest tenth.

(c) Find the exact value of the highlighted region. *Hint: Calculus is not required to do this.*

(d) How accurate is L_6 in finding the area? Would L_4 be more or less accurate? Would L_8 be more or less accurate?

Student Skills

Writing Mathematics

As you are working through a math exercise, do you ever feel yourself wanting to write more? Do you find yourself wanting to write less?

Mathematics is a strange subject in that we are often taught to write the least amount that we possibly can. This is reinforced in textbooks, solution manuals, lectures, and really any time that we are introduced to any mathematics in any case! There are lots of reasons for this, but learning is not one of them.

This may be counter intuitive, but I challenge you to *write way more than you think is necessary*. But how much is sufficient? I suggest this: **Write enough so that what you write would be clear to you if you were to read your writing one year from now**. If any computations are unclear, use words to explain your thought process. Always do the best that you can to describe what is going on in your head.