Math 112 End of Week 5 Newsletter

UPCOMING SCHEDULE:

Friday (Today): 12.4/13.2 – Definite Integrals, Areas, and the Fundamental Theorem of Calculus
Monday: 13.2/Exam Review - Intro to Antiderivatives and Indefinite Integrals (working backwards)
Tuesday: Homework Questions and Review
Wednesday: Review
Thursday: **Exam 2**
Next Friday: 13.3: Areas between Curves
Activity 6 Solutions: https://sites.math.washington.edu/~aloveles/Math112Winter2018/Activity06key.pdf
Activity 7 Solutions: https://sites.math.washington.edu/~aloveles/Math112Winter2018/Activity07key.pdf
(The activity solutions links will be active the day after you complete the activities in quiz section).

HOMEWORK: Closing Tuesday: HW 12.4 **and** HW 13.2

NEW POSTINGS: There are a lot of new postings. You can find them in the most recent announcement and on the right side of the course page. I also provide direct links below:

1. Overview of 12.4: Applications and Review *(this contains a full review with several problems from old exams)**:***
https://sites.math.washington.edu/~aloveles/Math112Winter2018/m112review12-4.pdf

2. Overview of 13.2:
https://sites.math.washington.edu/~aloveles/Math112Winter2018/m112review13-2.pdf

3. Exam 2 Review Sheet:
https://sites.math.washington.edu/~aloveles/Math112Winter2018/m112reviewExam2.pdf

OLD EXAMS: You can also see the entire exam archive here: https://sites.math.washington.edu/~m112/Archives.html
Note: We have put together two collections of old exam review problems. I encourage you to print these off now. You will be able to understand how to do most of these problems by the end of next week (and many of them you can already do):

For practice with 12.4: Applications
All of: https://sites.math.washington.edu/~m112/Midterm2/ExamIIReview.pdf

For practice with 13.2: Fundamental Theorem of Calculus and Areas
Problem 1(c): https://sites.math.washington.edu/~m112/Midterm2/Sp17_bekyel_MT2.pdf
Problem 3(b) and 5(d): https://sites.math.washington.edu/~m112/Midterm2/112_Wi16_MT2_nichifor.pdf
Problem 4 of: https://sites.math.washington.edu/~m112/Midterm2/win14examIIloveless.pdf
Problem 4a of: https://sites.math.washington.edu/~m112/Midterm2/spr16examIItaggart.pdf
Pages 3 and 4 of: https://sites.math.washington.edu/~m112/Midterm2/ExamIIReview.pdf

On the next several pages, I give detailed comments and hints (and several answers) for homework based on common questions from office hours. Please, please, please read these hints. I'm trying to get you to start and finish the upcoming homework now, so that you have more time to study for the exam next week.

Read the next pages!!! I give hints for every homework problem in 13.2!!! Read on…

Homework Hints: Answers and comments to common Questions from office hours.

General Comments and Hints on 11.1/11.2: When you type in the natural log function, you need parentheses! Don't type ln x, instead type ln(x). Here is an example from a problem: if you type "ln 6x", then webassign doesn't know if you mean ln(6)x or ln(6x) which are different things. So always put parentheses when using a function with a name like ln(x).
Also, I noticed that a lot of submitted correct answers were written in messy ways (indicating that maybe you didn't do the problem the nice clean way that you could have done it). So here I will do a problem from homework:

Find the derivative of $f(x) = \dfrac{\ln(6x)}{7x}$

STEP 1: Pull out coefficients/simplify:

$$f(x) = \frac{1}{7}\,\frac{\ln(6x)}{x}$$

STEP 2: Coefficient comes along, then use quotient rule:

$$f'(x) = \frac{1}{7}\left(\frac{x\left(\frac{1}{6x}\cdot 6\right) - \ln(6x)(1)}{x}\right) = \frac{1}{7}\frac{\left(1 - \ln(6x)\right)}{x}$$

You don't *have* to simplify, but it sure is much easier to type this in if you simplify a little bit. So simplify to save yourself typing!!

Here is another problem from homework:
Find the derivative of $f(x) = e^{(-7/x)}$

STEP 1: Rewrite the powers!

$$f(x) = e^{(-7x^{-1})}$$

STEP 2: Chain rule!

$$f'(x) = e^{(-7x^{-1})} \cdot (7x^{-2})$$

I just saw that too many people had missed these two problems (still a vast majority did get these correct, but enough students got them wrong or didn't do them cleanly that I thought it was worth of a comment).

General Comments and Hints on 12.1-3: It appears most students have completed this section quickly, nice work!
The only one I got asked about in quiz section was this one

Evaluate $\displaystyle\int \frac{6}{e^{5x}}\,dx$

STEP 1: Rewrite the powers!

$$\int \frac{6}{e^{5x}}\,dx = \int 6\,e^{-5x}\,dx$$

STEP 2: Use the rule (remember there are only 4 basic rules):

$$\int 6\,e^{-5x}\,dx = 6\left(\frac{1}{-5}e^{-5x}\right) + C = -\frac{6}{5}e^{-5x} + C$$

General Comments and Hints on 12.4:
Spend a lot of time on this section. Make sure you know how to do all these problems well. It is very likely that one of these questions will be on our midterm. We did several of these problems in our class. These problems bring together all the ideas from Chapter 10, 11, and 12.

Detailed Hints on 13.2:

13.2 / Problem 1: A(m) is the accumulated area under f(x). Thus, from lecture Friday, A'(m) = f(m).
You are given f(m) (which is the derivative of A(m)), so you should be able to use all the standard connections to answer the question. For example, A(m) changes from increasing to decreasing when f(x) changes from positive to negative.

13.2 / Problem 2: First recognized what you are given and what you want!
A(t) = height (in feet) = area under the given graph
A'(t) = r(t) = rate of ascent (in ft/min) - GIVEN THIS GRAPH
A''(t) = r'(t) = rate of rate of ascent (in ft/min^2) = slope of the given graph
Use all your standard techniques.
For example to find when the balloon is rising and getting slower, you need to find when A'(t) (which is the given r(t)) is positive and when A'(t) is decreasing (which is when r(t) is decreasing).
For part (i): Recall from earlier in the term that "Average rate of ascent from 0 to 3" = (A(3)-A(0))/(3-0).
Then remember that A(3) - A(0) = the area under r(t) from 0 to 3.

13.2 / Problems 3-13: These should be quick computation problems. See my integration examples in the 13.2 review.

13.2 / Problem 14: One note about units. The definite integral is a number. The units of that number are the units of the output times the units of the input (because it is an area). So for example, if f(x) is in ft/sec and x is in second, then
the definite integral of f(x) will output a number that is in units of feet. In this problem, the units of f(t) are (thousands of dollars)/year and the units of t are years, so the integral of f(t) will be in thousands of dollars. (so if you get the interval value to come out as 1847.576, then rounded to the nearest thousand dollars would give 1848 thousand dollars).

13.2 / Problem 15: In this case you can find the formula for F(m), so you might as well do it right away. At that point you have the formula for F(m) and F'(m). Do all the standard things to answer the questions.

13.2 / Problem 16: More practice with applications, this is a 12.4 questions (but the last part (f) is a definite integral)

At this point we can now ask any question about derivatives and anti-derivatives and their connections. Please go check out the exam archive for more practice. Make sure to bring questions to quiz section tomorrow to clear up any other questions you are having. I hope that helps.

Hope this helps.

- Dr. Andy Loveless