Math 125 End of Week 4 Newsletter

UPCOMING SCHEDULE:

Friday: Section 6.4 (Work)
Monday: Section 6.4/6.5 (Work and Average Value)
Tuesday: Exam 1 return and homework discussion (bring lots of homework questions!)
Wednesday: Section 7.1 (Integration by parts)
Thursday: Worksheet 5 – By Parts: http://www.math.washington.edu/~m125/Worksheets/IntByParts.pdf
Next Friday: Section 7.2 (Trig Integrals)
Homework Schedule: Closing **THURSDAY:** HW 3D, HW_4A, HW_4B (These cover 6.2/6.3 and 6.4)
Homework Stats: HW_3A: median score = 96%, median time = 120 minutes
HW_3B: median score = 98%, median time = 140 minutes
HW_3C: median score = 100%, median time = 107 minutes

NEW POSTINGS

Students often struggle initially with the concept of "Work" from section 6.4. Part of the problem is there aren't very many examples in the book. So I have created an extensive archive of additional examples which I hope you find useful. These include:

1. **6.4 Summary and Basic Practice Problems:**
   https://sites.math.washington.edu/~aloveles/Math125Winter2018/m125WorkReview.pdf
   Solutions: https://sites.math.washington.edu/~aloveles/Math125Winter2018/m125WorkReviewSolns.pdf
2. **6.4 Dr. Loveless Old Exam Questions:**
   https://sites.math.washington.edu/~aloveles/Math125Winter2018/OldExamWorkProblems%20-%20Loveless.pdf
   Solutions: https://sites.math.washington.edu/~aloveles/Math125Winter2018/OldExamWorkProblems%20-%20Loveless%20-%20Solutions.pdf
3. **6.4 Challenge Problems** (this is a random assortment of challenging problems from old midterms/finals, don't try these unless you have tried everything else and done the homework)
   https://sites.math.washington.edu/~aloveles/Math125Winter2018/sp13m125WorkExamples.pdf
   Solutions: https://sites.math.washington.edu/~aloveles/Math125Winter2018/sp13m125WorkExamplesSolns.pdf

OLD EXAMS:

The math departmental **exam 2 archive** is here: http://www.math.washington.edu/~m125/Quizzes/Q8.php
My personal exam 2 archive is here (scroll down the page):
https://sites.math.washington.edu/~aloveles/Math125Winter2018/LovelessExamArchive.html
Here are some targeted practice problems from old exams on the current material:

for practice using Section 6.4 material:

Chain:
Problem 3: https://www.math.washington.edu/~m125/Quizzes/week8/win13_mid2.pdf
Problem 4: https://www.math.washington.edu/~m125/Quizzes/week8/win16_pollack_2.pdf
Pumping:
Problem 1: https://www.math.washington.edu/~m125/Quizzes/week8/mid2h.pdf
Problem 2: https://www.math.washington.edu/~m125/Quizzes/week8/mid2b.pdf
Problem 4: https://www.math.washington.edu/~m125/Quizzes/week8/125_Au14_MT2.pdf
Leaky Bucket:
Problem 6: https://sites.math.washington.edu/~aloveles/Math125Winter2018/m125sp06e2.pdf
Problem 5(b): https://sites.math.washington.edu/~aloveles/Math125Winter2018/f09m125e2.pdf

I hope some of this helps.

Also check out the next page for homework hints!

HOMEWORK COMMENTS AND HINTS:

On HW_3D: On the torus problem, you'll have to do quite a bit of set up. Then you'll do a substitution. And at some point you'll split up the problem into two integrals to compute. One of the integrals you will get after you split up the problem is: $\int_{-r}^{r} \sqrt{r^2 - x^2}\,dx$ We currently do NOT have any algebraic methods for finding this integral (we will in section 7.3). BUT you don't need algebraic methods, if you draw the picture that goes with this integral you realize it is exactly half the region bounded by a circle with radius *r* which you should know has area ½ π r^2. So use

$$\int_{-r}^{r} \sqrt{r^2 - x^2}\,dx = \frac{1}{2}\pi r^2.$$

That will save you a lot of headache.

On HW_4A*:* You'll want to read all my posted examples before you start!

On Problems 4(b), if I was doing this in class, I would break it up into two problems (the part of the rope that makes it to the top and the part that doesn't). But Webassign requires you type on the set up all in one box. Not to worry, Set them up separately, then combine them into one integral.
Here is another similar example: Assume a rope with density 4 lbs/foot is used to pull up a 500 lbs weight to the top of a 300 foot building.

- The work to lift the coal is 500 lbs * 300 ft = 150000 ft-lbs. But that is the same as $\int_0^{300} 500\,dx$.
- The work to lift the cable is $\int_0^{300} 4x\,dx$.
- So the total answer is $\int_0^{300} 4x\,dx + \int_0^{300} 500\,dx = \int_0^{300} 4x + 500\,dx = \lim_{n\to\infty} \sum_{i=1}^{n} (4x_i + 500)\Delta x$

On Problem 6, don't overthink it. If you are given $PV^{1.4} = k$, then $P = k/V^{1.4}$. The problem tells you to integrate this to get work. But you need to start by converting some units. And you need to find k (you can find k because they give you a particular value of P and V).

On HW_4B: The robot problem is a bit of a challenge problem. Make sure to draw a picture of what the scenario will look like at the beginning and what it will look like at the end. Then you are trying to find a pattern for distance and force (like in all these problems).

Let's have a strong week.

- Dr. Andy Loveless