Math 114, Applications of the Integral (Sections 8.4, 8.5, 8.6)

Sections 8.4, 8.5, and 8.6 cover various practical applications of the integral, primarily in physics and economics. Instead of introducing this material with reading and discussion assignments, we will have **group presentations** on topics from each section.

Preparing and Giving the Presentation

1. Read and discuss the relevant section (or portion of a section) of the textbook.
2. Solve your assigned presentation problem. An asterisk indicates a challenge problem.
3. Write up your solution (only one per group) and turn it in on the day that you present.
   - Your written solution will count as a quality solution. (+1) for challenge problem.
4. Create and rehearse your presentation. (Time yourselves!)
5. Outline your presentation on the board, *before* class starts, on the day of your presentation.
6. Present your topic, in a 7-10 minute oral presentation, in which each group member speaks.
   - Explain the physics or economics background and why an integral is appropriate in this situation; then explain the solution to your assigned problem.
   - The oral presentation will count towards your grade like a quality solution.
   - Graded for: clarity of delivery, depth of conceptual explanations, correctness of content.

1. Presentation Problems

Each group of students will present one or two of the eight application topics below. I will email the class to solicit input on the assignment of groups and topics. Once you have been assigned a topic, choose one of the presentation problems for your topic, listed below. You will receive a grade for the written solution of your problem as well as for the oral presentation of your problem. If you choose a challenge problem, the written solution receives a bonus, but the oral presentation does not.

8.4 (Nov 11) Density: 14 or 16*; Center of Mass: 24 or 26*
8.5 (Nov 14) Work: 12 or 16*; Pressure: 26a* or 30; Energy: 36*; Gravitation: 38&39*
8.6 (Nov 16) Income Stream: 20 or 32*; Consumer/Producer Surplus: 38*

Note. Problems 38 and 39 in Section 8.5 go together and count as *one* problem.

2. Practice Problems

After hearing the presentations on a given section, you will have an opportunity to start the practice problems in class. The practice problems are due at the beginning of the next class.

P 8.4 (due Nov 14) Density: 5, 9, 12, 15, 17, 19; Center of Mass: 8, 25, 27, 28, 29
P 8.5 (due Nov 16) Work: 4, 5, 11, 13, 15; Force and Pressure: 7, 28, 31, 32, 33
P 8.6 (due Nov 18) Income Stream: 11, 21, 29, 30, 31; Consumer/Producer Surplus: 35, 39

3. Quality Solutions

Choose **two** of the following problems (not both on the same topic) to write up nicely, as quality solutions. These are due at the beginning of class **Nov 18**, which is the first class after we have finished all the presentations. *All of these are challenge problems* and will receive the (+1) bonus.

QS 8.4: Density: 20, 22 Center of Mass: 32, 34
QS 8.5: Work: 24, 26b; Pressure: 34; Kinetic Energy: 36; Gravitational Force: 40&41
QS 8.6: Income Stream: 34; Consumer/Producer Surplus: 40

Note. Problems 40 and 41 in Section 8.5 go together and count as *one* problem.