TEST PREP on 5.3, 5.4, and 5.5 - Dr. Loveless

Format and Goals:

1. Work on Problem 1 below on your own for 3–5 minutes. Pretend this is a real exam.
2. Then compare your work and discuss with classmates. Your TA will circulate and check your progress.
3. Make sure your TA records your attendance and places a check on your paper for your records.
4. If you write on the board, answer a challenging question, or catch a mistake, let your TA know your name so they can record a participation bonus (one bonus per class; what the bonus means will be defined later).

Winter 2015 - Exam 1 - Problem 3(b) - Dr. Loveless:

3(b). (6 pts) A particle is traveling up and down along a straight line with velocity given by $v(t) = 4t^3 - 4t$ ft/sec at time t seconds.
Find the **total distance** traveled by the particle from $t = 0$ to $t = 2$.

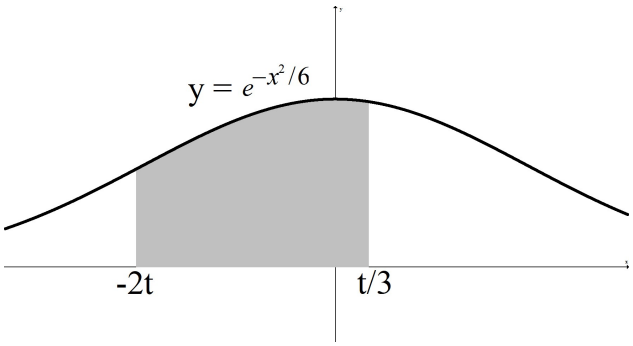
If you finish early, try some of the problems on the next page. Once everyone has finished Problem 1, decide as a class which homework questions to discuss. If the class is discussing a homework question you've already completed, use that time to work on the additional old exam problems.

Spring 2013 - Exam 1 - Problem 3(a) - Dr. Loveless: *FTOC Part 1*

3(a). The top of a wall is in the shape of $y = e^{-x^2}$ and the bottom is the x-axis, where x and y are in feet. The wall is being painted in such a way that the area covered at time t minutes is given by

$$A(t) = \int_{-2t}^{\frac{1}{3}t} e^{-\frac{1}{6}x^2}\, dx.$$

Find the rate at which the wall is being painted at $t = 2$ minutes.
That is, find derivative of $A(t)$ at $t = 2$. (Give units)



Winter 2018 - Exam 1 - Problem 3(a) - Dr. Loveless: *FTOC Concept*

3(a). (5 pts) If $\int_0^4 f'(x)\, dx = 10$, $\int_3^4 f'(x)\, dx = 2$, and $f(3) = 13$, then what is the value of $f(0)$?

Winter 2018 - Exam 1 - Problem 1) - Dr. Loveless: *Substitution Method*

1. Evaluate the integrals. If you do a substitution in a definite integral problem, you must show me that you can appropriately change the bounds to get full credit. Simplify your final answers.

   (a) $\displaystyle\int_0^{\pi/6} \frac{\sin(2x)}{(\cos(2x))^4}\,dx$

   (b) $\displaystyle\int x^3\sqrt{x^2+5}\,dx$

Winter 2018 - Exam 1 - Problem 3(b) - Dr. Loveless: *Tomato Problem - a relatively easy one*

3(b). A tomato is thrown downward from the top of a tall building. At $t = 3$ seconds after being thrown, the tomato is at a height of 240 feet and is traveling at a *downward* velocity of 110 feet/sec. Assume the acceleration of the tomato due to gravity is $a(t) = -32$ ft/sec^2.
Find the height of the building.

Winter 2013 Honors - Exam 1 - Problem 3(a) - Dr. Loveless: *Tomato Problem - Harder*
NOTE: This is from an "honors" calculus course I taught. It is the same concept, but much more involved. This is harder than what I would ask on our exam, but I hope it is a fun challenge, if you understand this, then you have a very good understanding of these sorts of problems.

5. (8 pts) A water balloon is dropped from the top of a building. You are standing exactly 300 feet directly below the water balloon when it is dropped and you plan to shoot an arrow straight up with an initial velocity of 60 feet/sec. Dr. Loveless' open window is 50 feet above you.

   How long after the balloon is dropped should you fire your arrow so that it reaches the balloon precisely when it is outside Dr. Loveless' window? Assume both the balloon and the arrow accelerate at a constant 32 feet/sec^2 downward.