# Test 2 Practice, Math 1410

Spring 2014, Dr. Graham-Squire

•Test 2 covers material from Section 2.7 to 3.8. There will be 8 to 10 questions on the test, and you will have the whole period to work on it.

•To study, you should read over your notes, try to re-work old HW and quiz problems, and work on practice problems out of the textbook. You can look at the questions at the end of Chapter 2 and you can also try to work the recommended practice problems listed on each section of class notes. You can also use the Test material on my website, but not all of the questions match. The Spring 2013 Test #2 is a good match, but questions such as #7 and 8 from the Test 3 could also fall on this test. The questions from Fall 2011 tests that best match this test are:

– Test 1: # 1 and 4

– Test 2: #1-7, 9, 10.

•It can be helpful to rewatch the video lectures, and/or look at a copy of the blank notes and try to work the examples and exercises. I also post the old Written Assignments, as well as some that we did not get to in class (but would be good for practice).

•A calculator might be useful for certain questions, but you will still need to show your work to get full credit. There will be at least one question where you cannot use a calculator.

•Below are some problems to work on to practice for the test. Be forewarned, though, that THE QUESTIONS ON THE TEST WILL NOT NECESSARILY BE THE SAME AS THE ONES BELOW! There are a variety of questions that I can ask, and the ones below are just a sample. If you just work the problems below, that does <u>not</u> mean that you are completely prepared for the test. If you get stuck on any of the problems below, that probably indicates an area where you should study some more.

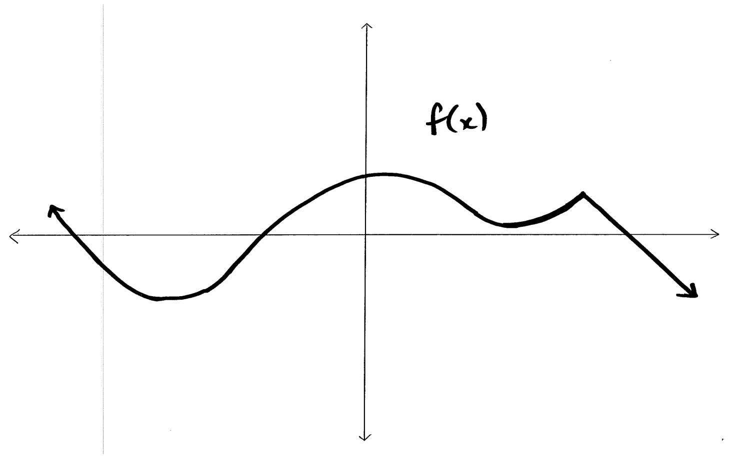
1. Use the limit definition of the derivative to calculate $\frac{d}{dx}(\sqrt{x-7})$.

2. A particle moves along a horizontal line so that after $t$ seconds its position is given by

$$s(t) = \frac{5}{3}t^3 - 10t^2 + 15t$$

   When is the particle moving left? Note: positive direction is to the right, so increasing = moving right. (Also, you should <u>use the derivative rules</u> to solve this question, and every question after this one. You do not have to use the definition of the derivative).

3. Sketch a graph of $f'(x)$ if $f(x)$ is the graph given below:




4. Find $y'$ if $y = \dfrac{e^{-x}\cos x}{\ln x}$

5. Find the $x$-coordinate(s) when the given function has a horizontal tangent line

$$T(x) = x^2 e^{1-3x}$$

Hint: It will help to simplify the derivative by factoring. You can check your answer by graphing the function.

6. Find $\dfrac{dy}{dx}$ if $y = \sqrt[3]{x + \sqrt{2}\sec x}$

7. Find $y'$ if $\ln(xy) = e^{2x}$

8. Calculate $\dfrac{d}{dx}\tan(\arctan x)$ two different ways- First take the derivative and then simplify your answer. Next, simplify the expression first and then take the derivative. (Hint: $\cos(\arctan x) = \dfrac{1}{\sqrt{1+x^2}}$....do you know how to prove it?)

9. Use logarithmic differentiation to find $\dfrac{d}{dx}(x^{\ln\sqrt{x}})$

10. The volume of a right circular cone is given by $V = \frac{1}{3}\pi r^2 h$, where $r$ is the radius and $h$ is the height of the cone.

(a) Find the rate of change of the volume with respect to the radius, assuming the height is held constant.

(b) Find the rate of change of the volume with respect to the height, assuming the radius is held constant.

(c) Suppose $r = 3$ and $h = 4$. If you wanted to increase the volume the greatest amount, would it be more beneficial to increase the radius slightly or the height slightly? Use your results from parts (a) and (b) to explain your answer.