Test 2 Practice, Math 1410
Spring 2013, Dr. Graham-Squire

●The test will cover sections 3.7, 3.8, 3.9, 4.1-4.3, 4.5 and 4.6.

●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 Chapters 3 and 4, 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 questions from Test 2 on my website that fit this test are #8 and 10, and from Test 3 they are #1, 2, 4, 5, 6, 7(b), 9.

●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.

●Some practice problems to work on in class today:

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

2. Let $f(x) = \ln(2-x)$.
   (a) find the differential dy.
   (b) use the differential to approximate $\ln(1.7)$
   (c) calculate $\ln(1.7)$ on your calculator. How close is your approximation?

3. Dominic has attached his baby sister Eva to a kite and is letting the baby drift away in the wind. Assuming that the kite stays at a constant height of 100 feet above the ground and kite string is coming out of the spool at a constant rate of $5\sqrt{3}$ feet/minute, find the rate at which the angle of elevation (that is, the angle between the kite string and the ground) is changing when the kite string is 200 feet long.

4. Find the absolute maximum and absolute minimum of the function $f(x) = \frac{2}{3}x^3 - \frac{3}{2}x^2 - 9x + 2$ on the interval [-2, 5].

5. Sketch the graph of $f(x)$ given that:
   ●$f(0) = 3$ and $f(1) = 0$
   ●$x = 2$ is a vertical asymptote.
   ●$f'(x) > 0$ on $(-\infty, -1)$, $(2, 5)$ and $(5, \infty)$
   ●$f'(x) < 0$ on $(-1, 2)$.
   ●$f''(x) > 0$ on $(-\infty, -2)$ and $(5, \infty)$
   ●$f''(x) < 0$ on (-2, 2) and (2, 5)
   ● $\lim\limits_{x \to \infty} f(x) = \infty$ and $\lim\limits_{x \to (-\infty)} f(x) = 1$

6. Find all local maximums, minimums, and intervals of decrease or increase for the function $f(x) = \frac{x^2 - 1}{x^3}$.

7. Calculate (a) $\lim\limits_{x \to \pi^+} \dfrac{x - \pi}{\cos x}$

   (b) $\lim\limits_{x \to \infty} \ln(x^4 + 3) \cdot x^{-2}$

8. A farmer wants to use fencing to construct a rectangular pen and subdivide it into six equal rectangles. Thus the fencing will be used for both the perimeter of the pen <u>and</u> the pieces that go across the inside to form the subdivisions. The farmer has exactly 408 meters of fencing. Find the outer dimensions of the pen he can build with the <u>maximum</u> possible area. Use calculus to explain how you know that your answer is a maximum.