Weekend Activity 1: Reviewing Calculus

The following should serve as a brief review of important computational skills from Calculus 1. You should complete this review by Tuesday so we can discuss it in class. This activity will not be collected, so you do not need to write up your solutions formally. If you get stuck, begin exploring the first half of your textbook for assistance.

1. Evaluate the following limits, or explain why the limit does not exist

   a) $\lim\limits_{x \to \infty} \dfrac{x^2 + 3x + 2}{x + 3}$

   b) $\lim\limits_{x \to \infty} \dfrac{sin(x)}{x}$

   c) $\lim\limits_{x \to 2} \dfrac{x^2 - 4x + 4}{x^2 - 5x + 6}$

2. Find the tangent line to the curve at the specified x-value.

   a) $y = ln(sin(x)); x = \pi$

   b) $y = e^{\pi}; x = 2$

   c) $y = cos^{-1}(\sqrt{x}); x = 1/2$

3. Draw the following graphs, without using a calculator (recall, you will not be permitted to use a calculator on exams). Label any important points.

   a) $ln(x) + 1$

   b) $\frac{sin(x)}{x}$

   c) $e^{(x-2)}$

4. Evaluate the following sums.

   a) $\sum\limits_{n=0}^{5} 2n$

   b) $\sum\limits_{k=1}^{4} \dfrac{k^2 - 1}{k}$

   c) $\sum\limits_{n=1}^{1000} n - (n - 1)$

5. Find the most general antiderivative of the function

   a) $f(x) = 3x^3 - 6x^2$

   b) $f(x) = \frac{x^4 + 2\sqrt{x}}{x^3}$

   c) $f(x) = 2e^x + sec^2(x) + 2$

6. State the following as well as you can remember, then check your answer in the book:

   a) The chain rule

   b) The limit definition of the derivative; include a picture showing how this definition relates to the slope of the tangent line

   c) The limit defnition of continuity

7. Evaluate the following limits or explain why the limit does not exist

   a) $\lim\limits_{x \to 0} \dfrac{4x - sin(x)}{x}$

   b*) $\lim\limits_{x \to 0} x^x$

   c) $\lim\limits_{x \to \infty} \dfrac{g(x)}{f(x)}$ Where $f(x)$ is an exponential function and $g(x)$ is a polynomial. Explain your answer.

8. What are the steps necessary to find the maximum value of a function $f(x)$ on an interval [a,b]?

9. A Puzzle Challenge: It is possible to fill in the holes in the chart below with the given information. Can you do it?

function	positive/ negative	increasing/ decreasing	concave up /concave down
F(x)	negative	increasing	
f(x)		decreasing	
f'(x)			down
f"(x)	negative		up