Name:_____ **10/5/2017**

Math 205 Elements of Calculus **Practice Exam 1**

1. (8 points) Let

$$f(x) = \sqrt{x^2 - 1}, \quad g(x) = 2x + 5.$$

Find both $f(g(x))$ and $g(f(x))$.

2. (16 points) Give an equation for the line that passes through the point $(-2, 3)$ and

(a) is horizontal;

(b) is vertical;

(c) is parallel to the line $2y - 6x = 1$;

(d) also passes through the point $(1, 1)$.

3. (8 points) Evaluate each of the following expressions.

   (a) $36^{-1/2}$

   (b) $64^{2/3}$

   (c) $\log_2(1/16)$

   (d) $\ln(e^7)$

4. (8 points) Suppose $\ln a = 4$, $\ln b = -5$, and $\ln c = 6$. Use log rules to evaluate

$$\ln\left(\frac{a^8}{b^3c^5}\right).$$

5. (8 points) Suppose $f(x) = Ca^x$, where C and a are both constants and $a > 0$. If $f(0) = 500$ and $f(3) = 8000$, find C and a.

6. (20 points) Evaluate each of the following limits.

(a) $\lim_{x \to 2^-} \dfrac{x-3}{x-2}$

(b) $\lim_{x \to 2^+} \dfrac{x-3}{x-2}$

(c) $\lim_{t \to -1} \dfrac{t^2 - 3t - 4}{t+1}$

(d) $\lim_{w \to 3} \dfrac{\frac{1}{w} - \frac{1}{3}}{w-3}$

(e) $\lim_{x \to 0} \dfrac{\sqrt{x^2 + c} - \sqrt{c}}{x^2}$

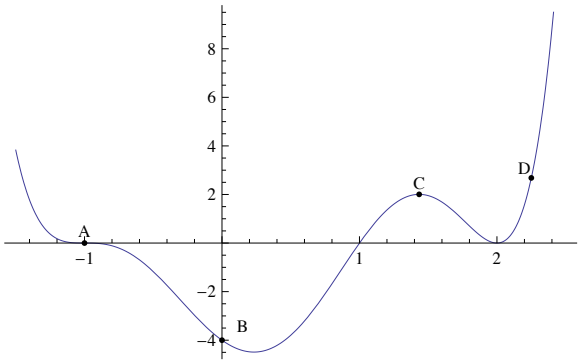
7. (8 points) Let

$$f(x) = \begin{cases} cx^2 + 2x & \text{if } x < 2 \\ x^3 - cx & \text{if } 2 \leq x \end{cases}$$

For what value of the constant c is the function f continuous everywhere?

8. (8 points) Let $f(x) = 2x^2 - 3x$. Use the definition of the derivative as a limit to evaluate $f'(2)$.

9. (12 points) Below is the graph of a function $y = f(x)$. Fill in the chart with $+$, $-$ or 0 to indicate whether f, f' and f'' are positive, negative or zero at each of the indicated points A,B,C and D.



Point	f	f'	f''
A			
B			
C			
D			

10. (8 points) A manufacturers weekly cost, in dollars, for producing q lamps is

$$C(q) = 810 + 3q + 0.002q^2.$$

Find the number of lamps that should be produced in order to minimize the average cost.

11. (8 points) Find the production level that will maximize profit if the cost and demand functions are the following.

$$C(q) = 680 + 4q + 0.01q^2$$

$$D(q) = 12 - 0.002q$$