231 TEST 2

You may use your notebook during the last half hour of this exam.
You may NOT use calculators, cell phones, loose papers, or peeking.

Math 231
March 3, 2011 **Name:** ______________________________

By printing my name I pledge to uphold the honor code.

1. Random stuff. Short answer.

a) Write down the formal definition of the limit statement $\lim\limits_{x \to 1^+} \frac{2x+3}{x-1} = \infty$.

b) Write down the formal definition of the limit statement $\lim\limits_{x \to \infty} \frac{2x+3}{x-1} = 2$.

c) $f(x) = 5 - (x-2)^2$ satisfies the hypothesis of the Extreme Value Theorem on $[0, 3]$ because it is continuous on that closed interval. Find x-values M and m in $[0, 3]$ that satisfy the conclusion of the Extreme Value Theorem.

d) $f(x) = 5 - (x-2)^2$ satisfies the hypothesis of the Intermediate Value Theorem on $[0, 3]$ because it is continuous on that closed interval. Find an x-value c that satisfies the conclusion of the Intermediate Value Theorem for intermediate value $K = 1$.

2. Calculate! Show your work clearly and put boxes around final answers.

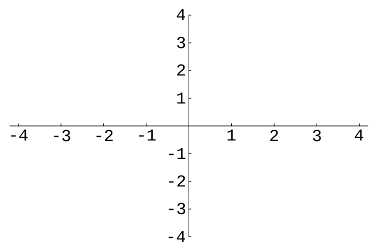
a) Find $\lim_{x \to 2} \dfrac{1}{2-x}$. Show your work and be as specific as possible about your answer.

b) Describe the roots, discontinuities, and horizontal and vertical asymptotes of $f(x) = \dfrac{x+2}{x^2+4x+4}$, if any. Use limits or values to support each of your answers.

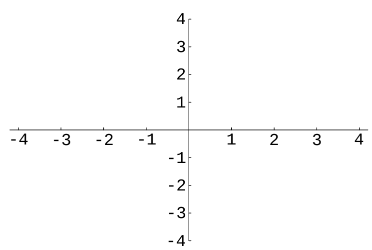
c) Use the $z \to x$ definition of derivative to show that $\frac{d}{dx}(\frac{2}{x-1}) = \frac{-2}{(x-1)^2}$.

3. Sketch clear, well-labeled graphs of functions that have the following properties.

a) A function $f(x)$ with $\lim_{x\to 2^-} f(x) = 2$, $\lim_{x\to 2^+} f(x) = -1$, $f(2) = 2$, $\lim_{x\to -\infty} f(x) = \infty$, and $\lim_{x\to\infty} f(x) = 3$.

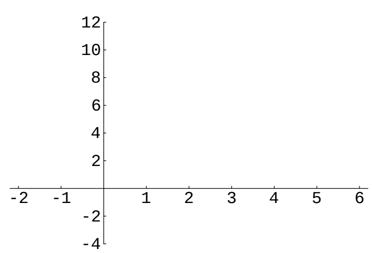


b) A function $f(x)$ with $f'(-2) = 0$, $f'(0) = 2$, and $f'(3) = -2$.

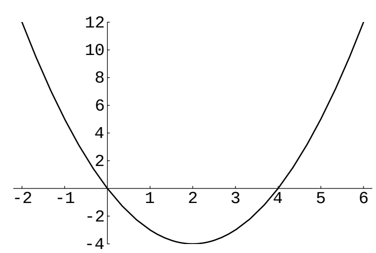


c) A function $f(x)$ whose DERIVATIVE looks like the one shown below right.

graph the function $f(x)$ here



this is the graph of $f'(x)$



Survey for 2 bonus points: How do you think you did? What is a question or topic that could have been on this exam, but wasn't?

sCRAP (I will not be grading anything on the scrap page)