Minitest 1A - MTH 1410
Dr. Graham-Squire, Spring 2014

Name: _____

I pledge that I have neither given nor received any unauthorized assistance on this exam.

_____

(signature)

DIRECTIONS

1. Show all of your work and use correct notation. A correct answer with insufficient work or incorrect notation will lose points.

2. Clearly indicate your answer by putting a box around it.

3. Cell phones and computers are <u>not</u> allowed on this test. Calculators <u>are</u> allowed on the first 3 questions of the test, however you should still show all of your work. No calculators are allowed on the last 2 questions of the test.

4. Give all answers in exact form, not decimal form (that is, put π instead of 3.1415, $\sqrt{2}$ instead of 1.414, etc) unless otherwise stated.

5. Make sure you sign the pledge.

6. Number of questions = 5. Total Points = 30.

1. (6 points) On the graph below, sketch a function $f(x)$ that satisfies the following properties. Note that there is more than one correct answer!

$$\lim_{x \to (-\infty)} f(x) = 2 \qquad\qquad\qquad\qquad f(1) = 2$$
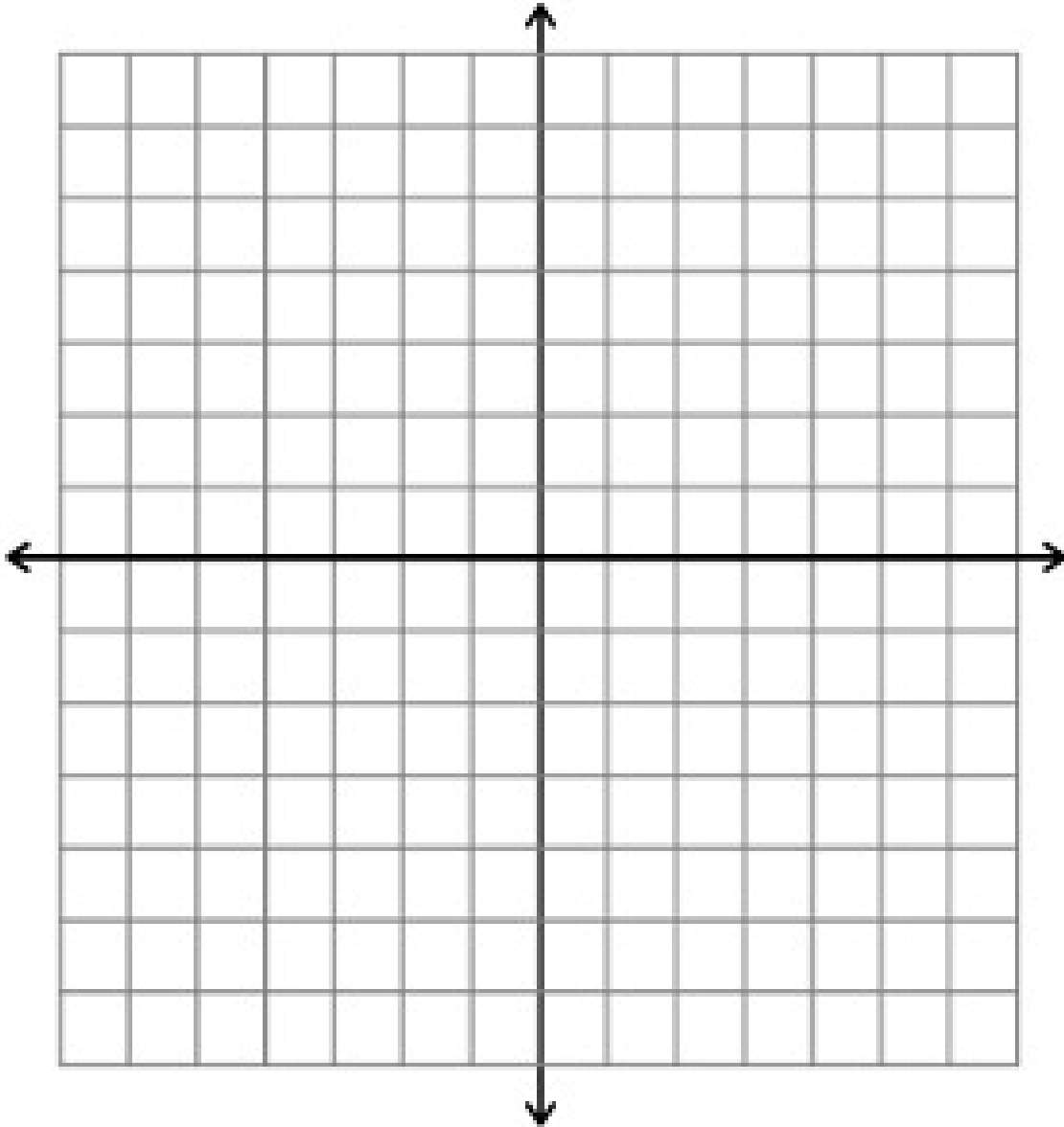
$$\lim_{x \to (-3)^-} f(x) = \infty \qquad\qquad\qquad\qquad f'(1) = 0$$

$$\lim_{x \to (-3)^+} f(x) = -\infty$$

$$\lim_{x \to 4^+} f(x) = -1 \text{ and } f(x) \text{ has a discontinuity at } x = 4$$

2. (6 points) Use the <u>definition of the derivative</u> to calculate $f'(1)$ for $f(x) = \dfrac{1}{\sqrt{x}}$.

3. (6 points) For what value of c will the function be continuous for all real numbers? Make sure to show your work and use the definition of continuity as part of your explanation.

$$f(x) = \begin{cases} 2c & \text{if } x \leq 0 \\ \dfrac{1}{x}\left(\dfrac{5}{2} - \dfrac{5}{2-x}\right) & \text{if } x > 0 \end{cases}$$

4. (6 points) Calculate the limits. Make sure to show your work and use correct notation!

(a) $\displaystyle \lim_{x\to 3^-} \frac{x^2 - 3x - 4}{x^2 - 4x + 3} =$

(b) $\displaystyle \lim_{x\to(-2)^+} \frac{x^2 - x - 6}{x^2 + 2x} =$

5. (6 points) Calculate each limit. Explain your reasoning or show it in a mathematically correct way. If the limit does not exist, explain (briefly) why.

(a) $\lim\limits_{x \to (-\infty)} \dfrac{3x^6 - 2x}{4x^3 - x^5} =$

(b) $\lim\limits_{x \to (-\infty)} \dfrac{10}{2 + 3e^x} =$

Extra Credit (1 point) Calculate $\lim\limits_{x \to \infty} \dfrac{\sin x}{x}$.