Матн 105	TEST #1	FALL 2015		
Name:				

Read This First!

- This is a closed-book examination. No books, notes, calculators, cell phones, communication devices of any sort, webpages, or other aids are permitted. Cell phones out of sight.
- Please read each question carefully. Show ALL work clearly in the space provided. You may
 use the backs of pages for additional work space.
- In order to receive full credit on a problem, solution methods must be complete, logical and understandable
- Answers must be clearly labeled in the spaces provided after each question.
- The exam consists of Questions 1-6, which total to 100 points. Question 7 is a bonus question (5 points extra credit) that is optional.

Grading - For Instructor Use Only

Question:	1	2	3	4	5	6	7	Total
Points:	24	18	20	15	15	8	0	100
Score:								

1. [24 points] Compute the following limits. If $+\infty$ or $-\infty$ is a correct answer, please give it.

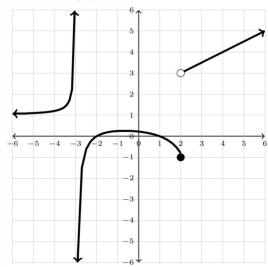
(a)
$$\lim_{x\to 1} \frac{1+x^2}{1+x}$$

(b)
$$\lim_{x\to 1} \frac{x-1}{x^2+x-2}$$

(c)
$$\lim_{x\to 4^+} \frac{x^2-1}{4-x}$$

(d)
$$\lim_{x \to 1} \frac{\sqrt{x^2 + 1} - \sqrt{2}}{x - 1}$$

2. [18 points] Consider the following graph:



- (a) What is the domain of f? Express your answer in interval notation.
- (b) For which x's is f(x) = 0?
- (c) For which x's is f(x) < 0? Express your answer in interval notation.
- (d) Is f continuous at 2? Explain you answer using the definition of continuity.

3. [20 points] Consider the function defined by

$$g(x) = \begin{cases} 1/x & x > 0 \\ 1 & x = 0 \\ 2 - x^2 & x < 0. \end{cases}$$

(a) Draw the graph of g.

(b) Use the graph of part (a) to find $\lim_{x\to 0^+} g(x)$, $\lim_{x\to 0^-} g(x)$, $\lim_{x\to 0} g(x)$ and g(0).

4. [15 points] Let

$$f(x) = \frac{x+1}{x+2}$$
 and $g(x) = \frac{1-x}{1+x}$.

Simplify f(g(x)) as much as possible.

5. [15 points] Suppose we know the limits

$$\lim_{x \to 2} f(x) = 4, \quad \lim_{x \to 2} g(x) = 3, \quad \lim_{x \to 2} h(x) = 0.$$

(a) What do the limit laws say about $\lim_{x\to 2} \frac{f(x)}{g(x)}$?

(b) What do the limit laws say about $\lim_{x\to 2} \frac{h(x)}{g(x)}$?

(c) What do the limit laws say about $\lim_{x\to 2} n(x)$



$$\lim_{x\to 2} \frac{g(x)}{h(x)}$$

6. [8 points] Find the equation of the line perpendicular to the line 2x+5y=10 that goes through the point $\left(-\frac{1}{2},2\right)$.

7. [5 points (bonus)] Let $f(x) = 1 - x^2$. Compute

$$\lim_{h\to 0}\frac{f\left(\frac{1}{x+h}\right)-f\left(\frac{1}{x}\right)}{h}.$$

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