Instructions. Do problems in space provided (continuing on back if necessary). This is a 100-point test.

1. [5 points] Using the absolute-value symbol and $<$ (or $>$), express the following statement in mathematical symbols: "the distance from W to 3 is strictly greater than 5".

2. [10 points] Describe as a union of intervals: the set of all x such that $|2x - 9| \geq 100$.

In problems 3 and 4, let ℓ be the line through (p, p^2) and (q, q^2), where p and q are any real numbers.

3. [5 points] Write the equation for ℓ in slope-intercept form $(y = mx + b)$:

4. [10 points] Express as a function of p: the value that q must have in order for ℓ to pass through $(0, 1)$:

5. [5 points] Write as a mathematical expression: "the average rate of change of $f(x)$ on the interval from $x = 6.9$ to $x = 7$."

6. [5 points] Express as a limit: "the instantaneous rate of change of $f(x)$ at $x = 7$."

7. [10 points] An object falls from 256 feet, so its height after t seconds of falling is $256 - 16t^2$ feet. At what time does it hit the ground? Express as a limit: the object's instantaneous velocity when it hits the ground. Evaluate this limit.

8. [5 points] Explain the meaning of the expression "$\lim_{x \to 3} f(x) = 5$" in plain English, *without* using the word "limit."

9. [5 points] Explain the meaning of the expression "$\lim_{x \to \infty} f(x) = 8$" in plain English, *without* using the word "limit."

10. [5 points] Draw a graph of f to illustrate: "$\lim_{x \to 2} f(x)$ does not exist because the one-sided limits are different."

11. [5 points] Draw a graph of f to illustrate: "$\lim_{x \to 2} f(x)$ does not exist because f has an asymptote."

12. [5 points] Draw a graph of f to illustrate: "$\lim_{x \to 2} f(x)$ does not exist because f oscillates."

10. Find the limit if it exists. If it does not exist, explain why.

a. [5 points] $\displaystyle\lim_{x \to 3} \frac{x^2 - 9}{x - 3}$

b. [5 points] $\displaystyle\lim_{x \to 3} \frac{x^2 - 9}{x - 4}$

c. [5 points] $\displaystyle\lim_{x \to 5} \frac{x^2 - 9}{x - 4}$

d. [5 points] $\displaystyle\lim_{x \to 3} \frac{x^2 - 4}{x - 3}$

e. [5 points] $\displaystyle\lim_{x \to 0} \cos \frac{1}{x}$

This page is for you to give me feedback about the course so far. PLEASE DETATCH THIS PAGE FROM YOUR TEST AND HAND IN SEPARATELY. You may submit this without a name, if you wish, or you may sign it.

Think about the following kinds of questions: Among the things we have done in class, what do you most like/not like? What kinds of things are you anxious to learn about? What kinds of work do you find most rewarding, *etc.* Do you have any concerns about the way we have been working?

Thank you for your feedback .