

# Math 171 - Quiz 4

September 12, 2013

Name key

Score \_\_\_\_\_

Show all work to receive full credit. Supply explanations when necessary. When computing limits, you may have to use  $+\infty$ ,  $-\infty$ , or DNE.

1. (3 points) The following table gives the values of the continuous functions  $f$  and  $g$  at selected points near  $x = 0$ .

$x$	-0.01	-0.001	-0.0001	0.0001	0.001	0.01
$f(x)$	4.98	4.997	4.9999	4.9998	4.987	4.96
$g(x)$	0.092	0.0013	0.00002	0.00002	0.0013	0.091

Given this data, what would be a reasonable approximation for  $\lim_{x \rightarrow 0} \frac{f(x)}{g(x)}$ ? Explain your reasoning.

IT LOOKS LIKE  $\lim_{x \rightarrow 0} f(x) = 5$  AND

$$\left. \begin{array}{l} \lim_{x \rightarrow 0} \frac{f(x)}{g(x)} = +\infty \end{array} \right\}$$

$\lim_{x \rightarrow 0} g(x) = 0$ . IT ALSO LOOKS LIKE  $g(x) > 0$  ON BOTH SIDES OF  $x = 0$

2. (3 points) Consider the following piecewise function:  $g(x) = \begin{cases} 5x^2 - ax, & x \leq 2 \\ 15 + b \cos(\pi x), & x > 2 \end{cases}$

Find  $a$  and  $b$  so that  $g(2) = 12$  and  $g$  is continuous at  $x = 2$ .

$$\lim_{x \rightarrow 2^+} g(x) = g(2) = 12 \Rightarrow 15 + b \cos(2\pi) = 5(2)^2 - a(2) = 12$$

$$15 + b = 20 - 2a = 12$$

$$\Rightarrow \boxed{b = -3 \text{ AND } a = 4}$$

3. (4 points) Evaluate each limit.

(a)  $\lim_{x \rightarrow -4^+} \frac{x-2}{\sqrt{12-x}} = \frac{-6}{\sqrt{16}} = -\frac{6}{4} = \boxed{-\frac{3}{2}}$

(b)  $\lim_{x \rightarrow 5^-} \frac{x^2 - 2x - 15}{x^2 - 25} = \lim_{x \rightarrow 5^-} \frac{(x-5)(x+3)}{(x-5)(x+5)} = \frac{8}{10} = \boxed{\frac{4}{5}}$