

# Math 171 - Quiz 4

September 16, 2010

Name key

Score \_\_\_\_\_

Show all work to receive full credit. Supply explanations when necessary.

1. (1 point) What does it mean for the function  $f$  to be continuous at  $x = 5$ ?

$$\text{IT MEANS } \lim_{x \rightarrow 5} f(x) = f(5).$$

2. (6 points) Evaluate each limit. Use  $+\infty$  or  $-\infty$  if appropriate.

(a)  $\lim_{x \rightarrow 3^+} \frac{x-3}{x^2-x-6}$   $\frac{0}{0}$

$$= \lim_{x \rightarrow 3^+} \frac{\cancel{x-3}}{\cancel{x-3}(x+2)} = \boxed{\frac{1}{5}}$$

(b)  $\lim_{x \rightarrow 9^+} \frac{7-x}{x-9}$   $\frac{-2}{0}$

EXPECT INFINITE LIMIT...

JUST TO THE RIGHT OF  $x=9$ :

NUMERATOR IS NEG  $\Rightarrow \frac{-}{+} = -$   
DENOM IS POS

$$\lim_{x \rightarrow 9^+} \frac{7-x}{x-9} = -\infty$$

(c)  $\lim_{w \rightarrow -1^-} \frac{\sqrt{w^2+3}}{(w+1)^2}$   $\frac{2}{0}$

EXPECT INFINITE LIMIT...

JUST TO THE LEFT OF  $w=-1$ :

NUMER IS +  $\Rightarrow \frac{+}{+} = +$   
DENOM IS +

$$\lim_{w \rightarrow -1^-} \frac{\sqrt{w^2+3}}{(w+1)^2} = +\infty$$

TURN OVER FOR PROBLEM 3.

3. (3 points) Sketch the graph of a function that is defined for all  $x$  on  $[-5, 5]$  and satisfies all of the following conditions.

- $f$  is continuous at  $x = 2$
- $\lim_{x \rightarrow 2^-} f(x) = 3$
- $f$  is not continuous at  $x = -3$
- $\lim_{x \rightarrow -3} f(x) = 0$
- The graph of  $f$  has a vertical asymptote at  $x = 4$

