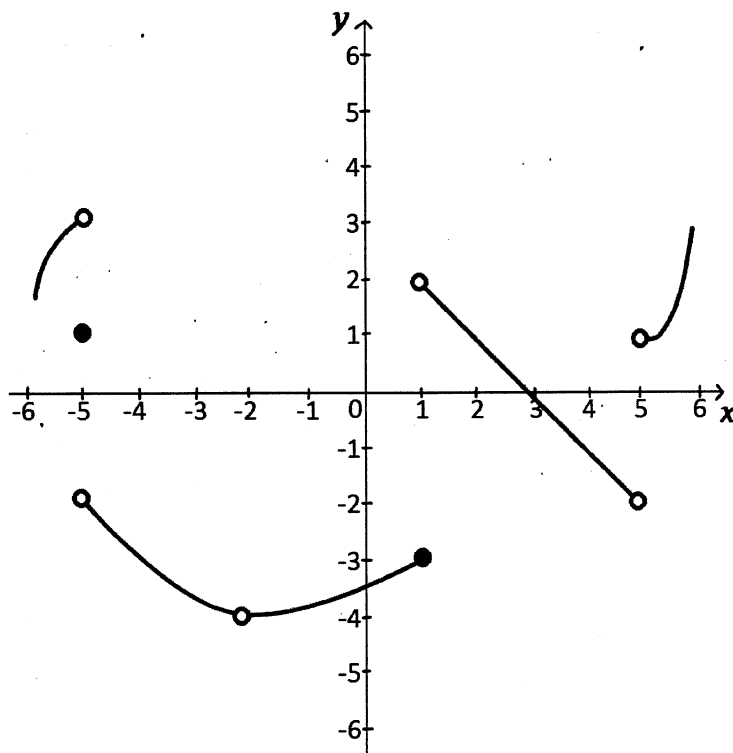# Math 131 - Quiz 1

January 18, 2023

Name __Key__

Score _____

Show all work to receive full credit. Supply explanations when necessary. This quiz is due January 23.

1. (4 points) The graph of $y = f(x)$ is shown below. Use the graph to solve each part of this problem.

(a) Estimate $\lim\limits_{x \to 0} f(x)$.

$\lim\limits_{x \to 0} f(x) \approx -3.5$

(b) Estimate $\lim\limits_{x \to -2} f(x)$.

$\lim\limits_{x \to -2} f(x) \approx -4$

(c) Explain why $\lim\limits_{x \to -6} f(x)$ does not exist.

f IS NOT DEFINED FROM THE LEFT OF $X = -6$. WE CANNOT APPROACH -6.

(d) Explain why $\lim\limits_{x \to 5} f(x)$ does not exist.

LIMIT FROM LEFT $= -2$
LIMIT FROM RIGHT $= 1$ } NOT EQUAL !

Turn over.

2. (3 points) Use a table of numerical values to approximate the following limit. Your
   table must show function values at six or more points.

$$f(x) = \frac{8}{x^2-4} - \frac{x}{x-2} \qquad \lim_{x \to 2} \left(\frac{8}{x^2-4} - \frac{x}{x-2} \right)$$

x	$f(x)$
1.9	-1.513
1.99	-1.501
1.999	-1.500
2.1	-1.488
2.01	-1.499
2.001	-1.500

IT LOOKS LIKE

$$\lim_{x \to 2} f(x) = \boxed{-1.5}$$

3. (2 points) Explain why each limit fails to exist.

   (a) $\displaystyle\lim_{x \to 5} \frac{2x-8}{|x-5|}$.

x	5.1	5.01	5.001	4.99	4.999
$f(x)$	22	202	2002	198	1998

FUNCTION VALUES grow WITHOUT BOUND AS $X \to 5$.

   (b) $\displaystyle\lim_{x \to 1} \sin\left(\frac{1}{1-x}\right)$ THIS IS ESSENTIALLY THE SAME LIMIT AS $\displaystyle\lim_{x \to 0} \sin\left(\frac{1}{x}\right)$,

   WHICH IS IN THE LECTURE NOTES.

   FUNCTION VALUES OSCILLATE AS $X \to 1$.   CHECK OUT THE graph.

4. (1 point) Use direct substitution to determine the limit.

$$\lim_{x \to 3} \left(\frac{x^2 - 3x + 7}{x - 5} \right) = \frac{(3)^2 - 3(3) + 7}{3 - 5}$$

$$= \frac{7}{-2} = \boxed{-\frac{7}{2}}$$