Math 131 - Quiz 1

August 21, 2025

Name key

Score _____

Show all work to receive credit. Supply explanations where necessary. Partial credit may be awarded on multiple choice problems for correct work or explanations.

1. (1 point) Suppose you are asked to use a table of values to estimate the limit of $h(x)$ at $x = -10$. Which x-value would definitely not be useful in your table?

   (a) $x = -10.001$

   (b) $x = -9.9$

   (c) $x = -10$ ← We don't care what happens at the limit point!

   (d) All of the x-values above would be useful.

2. (3 points) Use a table of values to estimate $\lim_{x \to 2} f(x)$, where $f(x) = \begin{cases} 6x + \sin(\pi x), & x < 2 \\ 5x + 2, & x > 2 \end{cases}$

   (a) The limit does not exist.

   (b) 12

   (c) 2

   (d) -12

x	$f(x)$	
1.9	11.09098	} Left of $x = 2$, Use $6x + \sin \pi x$
1.99	11.908589	
1.999	11.990858	
2.1	12.5	} Right of $x = 2$, Use $5x + 2$
2.01	12.05	
2.001	12.005	

Looks like limit is 12.

3. (1 point) Which of these is NOT a reason that a limit may fail to exist?

   (a) The limit from the left of the limit point is not equal to the limit from the right. Our reason #1

   (b) The function is not defined at the limit point.

   (c) The function's values grow without bound as the limit point is approached. Our reason #2

   (d) The function is not defined on the right side of the limit point. Our reason #4

Turn over.

4. (3 points) Use a table of values to estimate the following limit. Your table must show function values at six or more points.

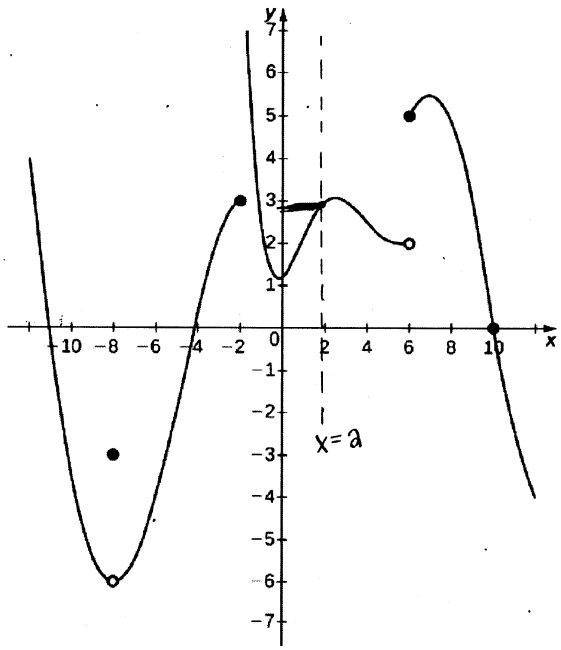
$f(x) = \dfrac{|x|}{x^3+5x}$ $\qquad \lim\limits_{x\to 1} \dfrac{|x|}{x^3+5x}$

x	$f(x)$
0.9	0.172117
0.99	0.167221
0.999	0.166722
1.1	0.161031
1.01	0.166110
1.001	0.166611

IT LOOKS LIKE THE LIMIT IS ABOUT 0.1667.

IN FACT, THE LIMIT IS $0.\overline{16} = \frac{1}{6}$.

5. (2 points) For this problem, refer to the graph of $y = f(x)$ shown below.



(a) Carefully explain why $\lim\limits_{x\to 6} f(x)$ does not exist. OUR FAILURE #1.

THE LIMIT FROM THE LEFT AT $x=6$ IS ABOUT 2. THE LIMIT FROM THE RIGHT IS ABOUT 5. LEFT LIMIT $\neq$ RIGHT LIMIT.

(b) Use the graph to estimate $\lim\limits_{x\to 2} f(x)$.

$\lim\limits_{x\to a} f(x) \approx 2.8$