

Math 131 - Quiz 1

August 24, 2023

Name key

Score _____

Show all work to receive full credit. Supply explanations when necessary. This quiz is due August 29.

1. (5 points) For each part of this problem, use a table of numerical values to estimate the limit. Your tables must show function values at six or more points. (Be sure your calculator is in radian mode.)

(a) $\lim_{x \rightarrow 0} \left(\frac{1}{\sin x} - \frac{1}{x} \right)$

x	$\frac{1}{\sin x} - \frac{1}{x}$
-0.1	-0.016686
-0.01	-0.0016667
-0.001	-0.00016667
0.1	0.016686
0.01	0.0016667
0.001	0.00016667

IT LOOKS LIKE

$$\lim_{x \rightarrow 0} \left(\frac{1}{\sin x} - \frac{1}{x} \right) = \boxed{0}$$

(b) $\lim_{t \rightarrow -2} \frac{\sqrt{t+6} - 2}{t+2}$

t	$\frac{\sqrt{t+6} - 2}{t+2}$
-2.1	0.251582
-2.01	0.250156
-2.001	0.250015
-1.9	0.248457
-1.99	0.249844
-1.999	0.249984

IT LOOKS LIKE

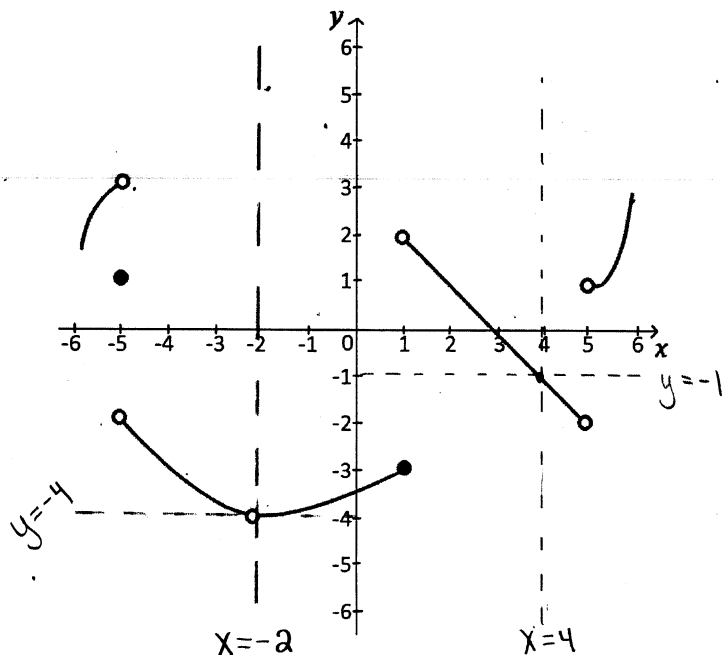
$$\lim_{t \rightarrow -2} \frac{\sqrt{t+6} - 2}{t+2} = \boxed{0.25}$$

Turn over.

2. (1 point) The graph of $y = f(x)$ is shown below. Use the graph to estimate each limit.

(a) $\lim_{x \rightarrow -2} f(x) = -4$

(b) $\lim_{x \rightarrow 4} f(x) = -1$



3. (4 points) Refer to the four ways in which a limit may fail to exist. Say why each of the following limits does not exist. Show work or supply a brief explanation.

(a) $\lim_{x \rightarrow 5} \frac{x^2 - 5}{|x - 5|}$ FAILURE #2: FUNCTION VALUES GROW WITHOUT BOUND AS $x \rightarrow 5$.
THE GRAPH HAS A VERT. ASYMP. AT $x = 5$.

(b) $\lim_{x \rightarrow 0} 5x \ln x$ FAILURE #4: $5x \ln x$ IS NOT DEFINED TO THE LEFT OF $x = 0$.

(c) $\lim_{x \rightarrow 3} \sqrt{x - 3}$ FAILURE #4: $\sqrt{x - 3}$ IS NOT DEFINED TO THE LEFT OF $x = 3$.

(d) $\lim_{x \rightarrow 0} \frac{\sqrt{x^2}}{x}$ FROM THE RIGHT, THE LIMIT IS 1.
FROM THE LEFT, THE LIMIT IS -1.

FAILURE #1: LIMIT FROM LEFT \neq LIMIT FROM RIGHT