Math 131 - Quiz 1

Name key

January 20, 2021

Score _____

Show all work to receive full credit. Supply explanations when necessary. This quiz is due on January 27.

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1. (2 points) Use a table of values to estimate the following limit. Your table must show function values at six or more points.

$$\lim_{x\to 3} \frac{5x-15}{4\ln(x-2)}$$

x	$f(x) = \frac{5x-15}{4\ln(x-2)}$
3.1	1.31151
3.01	1.25624
3.001	1.25062
2.9	1.18640
2.99	1.24374
2.999	1.24937

IT LOOKS LIKE $\lim_{x\to 3} \frac{5x-15}{4\ln(x-2)} \approx 1.25$

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

$$\lim_{x\to 1} \frac{\sqrt{x}-\sqrt[3]{x}}{x-1}$$

x	$f(x) = \frac{\sqrt{x}-\sqrt[3]{x}}{x-1}$
1.1	0.16529
1.01	0.16653
1.001	0.16665
0.9	0.16806
0.99	0.16681
0.999	0.16668

IT LOOKS LIKE $\lim_{x\to 1} \frac{\sqrt{x}-\sqrt[3]{x}}{x-1} \approx 0.1667$

3. (2 points) Use a table of values to estimate the following limit. Your table must show function values at six or more points. (Be in radian mode.)

$$\lim_{x\to 0} \frac{\sin x - \tan x}{x^3}$$

x	$f(x) = \frac{\sin x - \tan x}{x^3}$
0.1	-0.50126
0.01	-0.50000
0.001	-0.50000
-0.1	-0.50126
-0.01	-0.50000
-0.001	-0.50000

IT LOOKS LIKE

$\lim_{x\to 0} \frac{\sin x - \tan x}{x^3} \approx -0.5$

4. (2 points) There are four common ways a limit can fail to exist. In which of the four ways does the following limit fail to exist? Briefly explain your reasoning.

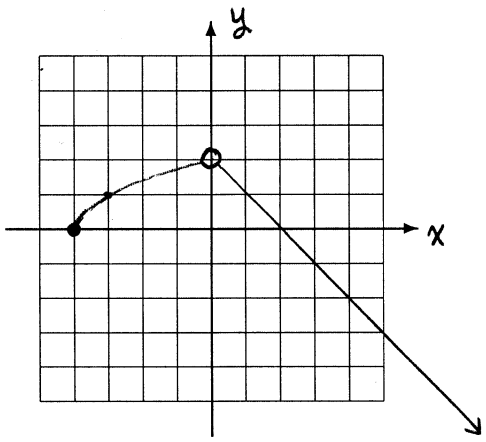
$$\lim_{x\to 0} \frac{7x^3 - 3x}{|x|}$$

A graph of $f(x) = \dfrac{7x^3-3x}{|x|}$ is attached.

It looks like the limit from the left of $x=0$ is not equal to the limit from the right.

5. (2 points) Carefully sketch the graph of the following piecewise-defined function. Then **use your graph** to find each limit. Provide a short explanation for each answer.

$$f(x) = \begin{cases} \sqrt{x+4} & -4 \le x < 0 \\ 2 - x, & x > 0 \end{cases}$$



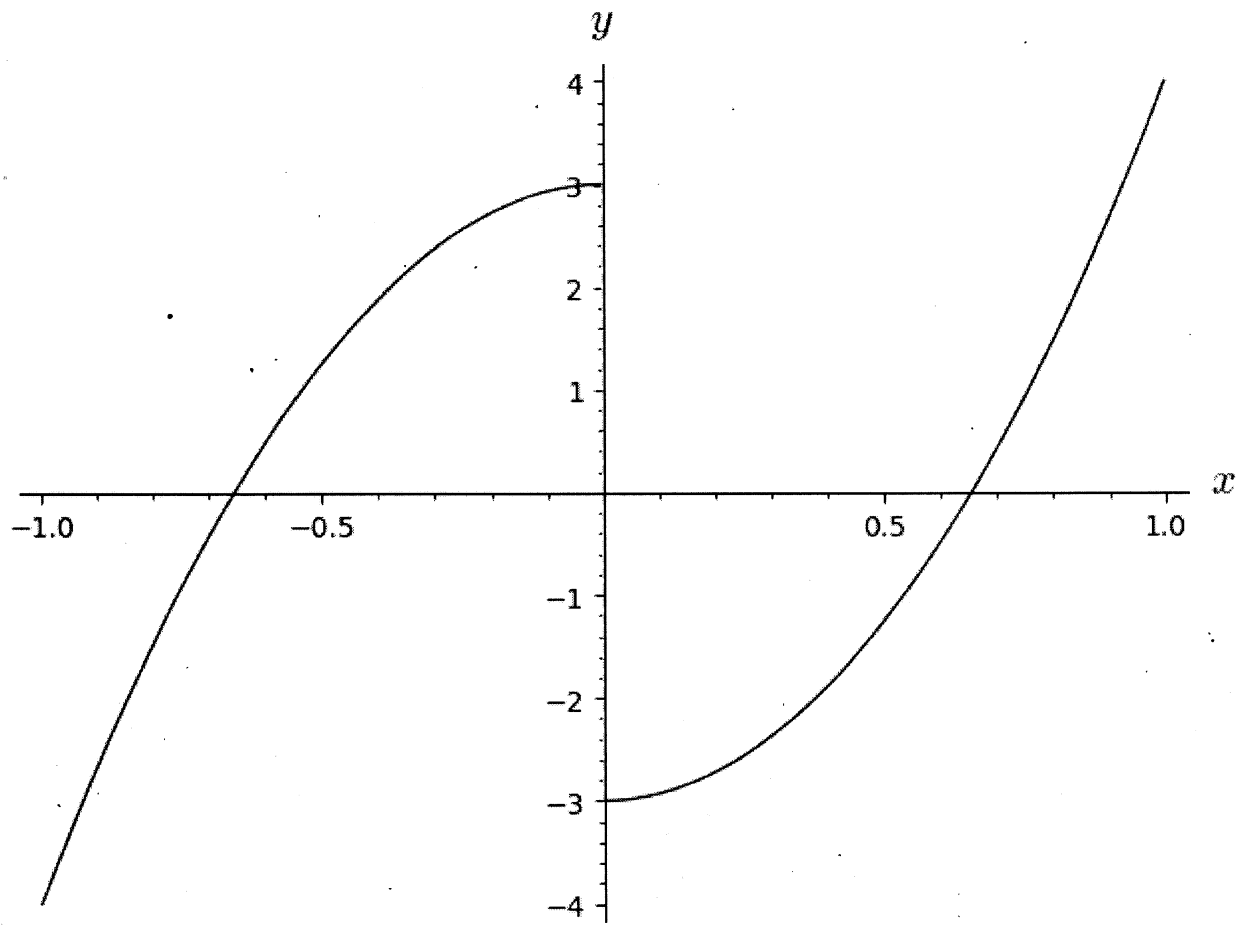
(a) $\lim_{x\to 0} f(x) = 2$

From both sides of $x=0$, points on the graph seem to be getting closer & closer to the height $y=2$.

(b) $\lim_{x\to -4} f(x)$

DNE. This is Failure #4 in our class notes.

It is not possible to have a limit because it is not possible to approach $x=-4$ from <u>both</u> sides.


y
x
4
3
2
1
−1
−2
−3
−4
−1.0
−0.5
0.5
1.0