Math 132 Fall 2017
Quiz 2 9/15/17 **Name (Print):** Key.

For problems 1 - 3, for each function $f(x)$ and value $x = a$ find $\lim_{x\to a^-} f(x)$, $\lim_{x\to a^+} f(x)$, and $\lim_{x\to a} f(x)$ if it exists.

1. $f(x) = \frac{(x+2)^2}{(x-1)^3 x}$ and x 3.

eval @ $x=3 \Rightarrow$ case: $\frac{N}{N}$

$\therefore$ substitute to evaluate:

$$\lim_{x\to 3^-} f(x) = \lim_{x\to 3^+} f(x) = \lim_{x\to 3} f(x) = f(3) = \frac{(3+2)^2}{(3-1)^3 \cdot 3} = \frac{25}{24}.$$

2. $f(x) = \frac{(x+1)^2}{(x-1)^2}$ and x 1.

case $\frac{N}{0}$ notice: denominator ≥ 0. + $(x-1)^2 = 0$ @ $x=1$.

$\therefore \frac{N}{0}$ evaluates to $+\infty$.

$$\lim_{x\to 1^-} f(x) = \lim_{x\to 1^+} f(x) = \lim_{x\to 1} f(x) = \infty$$

3. $f(x) = \begin{cases} (x+1)^2, & x < 1 \\ 0, & x = 1 \\ 4x, & x > 1. \end{cases}$ and $x = 1$.

left + right limits:

$\lim_{x\to 1^-} f(x) = 4$

$\lim_{x\to 1^+} f(x) = 4$

left limit = right limit

$\therefore$ limit exists.

$\lim_{x\to 1} f(x) = 4.$

4. Finally, consider $f(x)$ $2x - 3$ and note $\lim_{x\to 2} f(x) = 1$. For any $\epsilon > 0$ find $\delta > 0$ so that $|x - 2| < \delta$ implies $|f(x)$ $1| < \epsilon$.

Say $x = 2+h$

$|2(2+h)-3-1| < \varepsilon$

$|4+2h-4| < \varepsilon$

$|2h| < \varepsilon$

$|2h| < \varepsilon$

$|h| < \varepsilon/2$.

$h = x-2$

$\therefore$

$|x-2| < \varepsilon/2 = \delta$