

# Quiz 3

September 7, 2016

Show all work and circle your final answer.

1. Evaluate the following limit:  $\lim_{x \rightarrow 0} \frac{2 - \sqrt{x+4}}{x} \cdot \frac{2 + \sqrt{x+4}}{2 + \sqrt{x+4}}$

$$= \lim_{x \rightarrow 0} \frac{4 - (x+4)}{x(2 + \sqrt{x+4})}$$

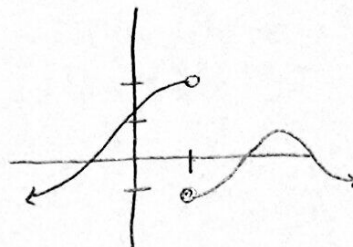
$$= \lim_{x \rightarrow 0} \frac{-1}{2 + \sqrt{x+4}} = \boxed{-\frac{1}{4}}$$

2. Sketch a graph of a function  $f$  satisfying all of the following conditions:

(a)  $\lim_{x \rightarrow 1^-} f(x) = 2$

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

(c)  $f(1) = -1$ .



What is  $\lim_{x \rightarrow 1} f(x)$ ? Why?

$\lim_{x \rightarrow 1} f(x)$  DNE because  $\lim_{x \rightarrow 1^-} f(x) \neq \lim_{x \rightarrow 1^+} f(x)$ .

3. Evaluate  $\lim_{x \rightarrow 0} x \sin\left(\frac{1}{x}\right)$ . (Hint: Use Squeeze Theorem)

$$-1 \leq \sin\left(\frac{1}{x}\right) \leq 1$$

$$-x \leq x \sin\left(\frac{1}{x}\right) \leq x$$

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

$$\begin{matrix} \parallel & & \parallel \\ 0 & & 0 \end{matrix}$$

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