

QUIZ #2  
Calc 140, Fall 2005  
HUNSICKER

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NAME \_\_\_\_\_ KEY \_\_\_\_\_ IRTLUHC \_\_\_\_\_

1) Give the precise definition of  $\lim_{x \rightarrow \infty} f(x) = L$  and explain with a diagram what it means.

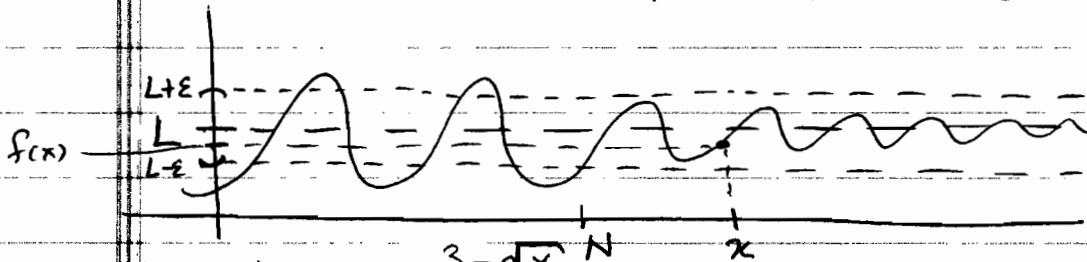
Def Let  $f$  be a function defined on some interval  $(a, \infty)$ .

Then  $\lim_{x \rightarrow \infty} f(x) = L$  means that for every  $\epsilon > 0$

there is a corresponding number  $N$  such that

$$|f(x) - L| < \epsilon \text{ whenever } x > N.$$

This says that for whatever the acceptable error is in output,  $\epsilon$ , we can ensure the error is smaller than that by choosing sufficiently large input, i.e.,  $x > N$ .



Here, if we choose  $x > N$ , then  $f(x)$  lies in  $(L - \epsilon, L + \epsilon)$ .

2) Find  $\lim_{x \rightarrow 9} \frac{3 - \sqrt{x}}{9 - x}$

$$\begin{aligned} &= \lim_{x \rightarrow 9} \frac{3 - \sqrt{x}}{9 - x} \cdot \frac{3 + \sqrt{x}}{3 + \sqrt{x}} = \lim_{x \rightarrow 9} \frac{9 - x}{(9 - x)(3 + \sqrt{x})} = \lim_{x \rightarrow 9} \frac{1}{3 + \sqrt{x}} \\ &= \frac{1}{\lim_{x \rightarrow 9} 3 + \sqrt{x}} = \frac{1}{\lim_{x \rightarrow 9} 3 + \lim_{x \rightarrow 9} \sqrt{x}} = \frac{1}{3 + \sqrt{\lim_{x \rightarrow 9} x}} = \frac{1}{3 + \sqrt{9}} = \frac{1}{6} \end{aligned}$$