Limit Quiz

Name: _____ Date: September 27, 2019

Thinking Strategies	Communication	Modelling & Solving

1. Given the function $f(x) = \sqrt{x+2}$, determine the slope of the tangent line to f at the point $(2,2)$ accurate to 2 decimal places.

try 2.001 1.999 @ $x=2$

$$\frac{\Delta y}{\Delta x} = \frac{\sqrt{4.001}-2}{2.001-2} \qquad \frac{\sqrt{3.999}-2}{1.999-2}$$

$$= 0.2500 \qquad = 0.2499$$

$$\Rightarrow \boxed{0.25}$$

2. How close to -1 does x need to be for the function $g(x) = \frac{6}{1-x}$ to be within 0.05 of 3?

$2.95 < g(x) < 3.05$

$$2.95 = \frac{6}{1-x} \qquad 3.05 = \frac{6}{1-x}$$

$x = -1.034$ $\qquad x = -0.967$

dist $= 0.034$ $\qquad$ dist $\boxed{0.033}$

3. (a) In your own words, define the limit.

as x gets close to c

$f(x)$ gets close to L

(b) Explain why $\lim_{x\to 0}\frac{1}{x}$ does not exist.

as $x \to 0$ $\frac{1}{x}$ blows up and doesn't get close to anything (just gets bigger)

(c) Determine the exact value of $\lim_{x\to 5}\dfrac{\frac{1}{\sqrt{x+4}}-\frac{1}{3}}{x-5}$

$$\lim_{x\to 5}\frac{3-\sqrt{x+4}}{3\sqrt{x+4}(x-5)}\cdot\frac{3+\sqrt{x+4}}{3+\sqrt{x+4}}$$

$$\lim_{x\to 5}\frac{9-(x+4)}{3(x-5)(\sqrt{x+4})(3+\sqrt{x+4})} = \frac{-1}{3(3)(6)} = \frac{-1}{54}$$

(let $x=5$)

4. Provide the defintion of continuity and show that the following function has a discontinuity.

$$h(x)=\begin{cases}6x-x^2 & x\le 2\\ 6 & x=2\\ \sqrt{12x+7} & x>2\end{cases}$$

if $f(c) = \lim_{x\to c} f(x)$

at $x=2$

$\lim_{x\to 2^-} 6x-x^2 = 8$ $\quad f(2)=6$

$\lim_{x\to 2^+} \sqrt{12x+7} = \sqrt{31}$