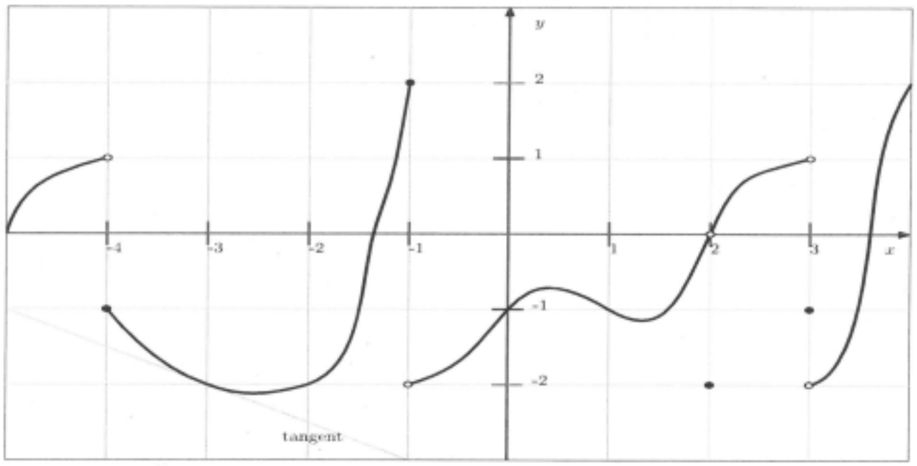
Math 1210: Quiz #2 **Fall 2017**

Name: Solutions	A#:	Section: G

[9] 1. Let f be a function whose graph of $y = f(x)$ is given below. Compute the following quantities or state that they do not exist.



(a) $f(3) =$ -1

(b) $\lim_{x\to 3} f(x) =$ D.N.E.

(c) $\lim_{x\to 2}(\underset{\nearrow 4}{x^2} + \underset{\nearrow 0}{f(x)})$ $= 4+0 = 4$

(d) $\lim_{x\to 1^-} f(x) =$ 2

(e) $\lim_{x\to -1^+} f(x) =$ -2

(f) $\lim_{x\to -4^-} \underset{\nearrow e^{-4}}{e^x} \underset{\nearrow 1}{f(x)}$ $= e^{-4}\cdot 1 = e^{-4} = \frac{1}{e^4}$

(g) The average rate of change of $f(x)$ over the interval $[-3,-1]$ $= \frac{f(-3)-f(-1)}{-3-(-1)} = \frac{-2-(2)}{-2} = 2$

(h) The instantaneous rate of change of $f(x)$ when $x = -3$ $-2/4 = -1/2$

(i) The equation of the secant line over the interval $[-3,-1]$ slope $= 4/2 = 2$; point $(-1,2)$

equation: $y-2 = 2(x+1)$

$y = 2x+4$

v2.G

[3] 2. Let $f(x) = \begin{cases} x^2 - 1, & \text{if } x < 2 \\ e^{x-2}, & \text{if } x \geq 2 \end{cases}$. Then

(a) $\lim_{x\to 2^-} f(x) = \lim_{x\to 2^-} x^2-1 = 4-1 = \boxed{3}$

(b) $\lim_{x\to 2^+} f(x) = \lim_{x\to 2^+} e^{x-2} = e^0 = \boxed{1}$

(c) The average rate of change of f over the interval $[2,4]$ is $\frac{f(4)-f(2)}{4-2} = \frac{e^{4-2}-e^{2-2}}{2} = \boxed{\frac{e^2-1}{2}}$

[8] 3. Compute the limit or state that it does not exist.

(a) $\lim_{x\to 1} \frac{3-\sqrt{x+8}}{x-1}$

$$\frac{3-\sqrt{x+8}}{x-1} \cdot \frac{3+\sqrt{x+8}}{3+\sqrt{x+8}}$$

$$= \frac{9-(x+8)}{(x-1)(3+\sqrt{x+8})}$$

$$= \frac{-\cancel{(x-1)}}{\cancel{(x-1)}(3+\sqrt{x+8})} = \frac{-1}{3+\sqrt{x+8}}$$

$$= \lim_{x\to 1} \frac{-1}{3+\sqrt{x+8}}$$

-1

$(3+3)$

$$= \boxed{\frac{-1}{6}}$$

(b) $\lim_{x\to -2^-} \frac{x^2+x-2}{|x+2|}$

$$|x+2| = \begin{cases} x+2, & x \geq -2 \\ -(x+2), & x < -2 \end{cases}$$

$$= \lim_{x\to -2^-} \frac{x^2+x-2}{-(x+2)}$$

$$= \lim_{x\to -2^-} \frac{\cancel{(x+2)}(x-1)}{-\cancel{(x+2)}} = \lim_{x\to -2^-} -(x-1) = \boxed{3}$$