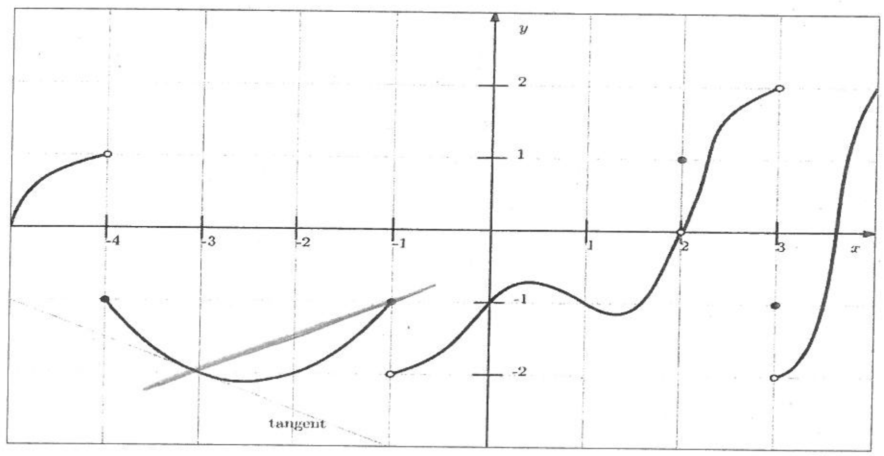
Math 1210: Quiz #2 Fall 2017

Name: Solution	A#:	Section: E,F

[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) $\lim_{x\to 3} f(x)$ $\lim_{x\to 3^-} f(x) = 2$ & $\lim_{x\to 3^+} f(x) = -2 \Rightarrow \lim_{x\to 3} f(x)$ Does not exist

(c) $\lim_{x\to 2}(x^2 + x + f(x)) = 4 + 2 + \lim_{x\to 2} f(x) = 4 + 2 + 0 = 6$

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

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

(f) $\lim_{x\to -4^-} e^{x+1} f(x)$ $\lim_{x\to -4^-} e^{x+1} \lim_{x\to -4^-} f(x) = e^{-3} \times 1 = e^{-3}$

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

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

(i) The equation of the secant line over the interval $[-3, -1]$ $y = \frac{1}{2}x - \frac{1}{2}$

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

(a) $\lim_{x\to 3^-} f(x) = \lim_{x\to 3^-} x^2 - 1 = 8$

(b) $\lim_{x\to 4^+} f(x) = \lim_{x\to 4^+} e^{x-3} = e$

(c) The average rate of change of f over the interval $[3, 5]$ is $\dfrac{e^{5-3} - e^{3-3}}{5-3} = \dfrac{e^2 - 1}{2}$

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

(a) $\lim_{x\to -1} \dfrac{x+1}{\sqrt{x^2+4x+7} - 2} \times \dfrac{\sqrt{x^2+4x+7}+2}{\sqrt{x^2+4x+7}+2} = \lim_{x\to -1} \dfrac{(x+1)(\sqrt{x^2+4x+7}+2)}{\underbrace{x^2+4x+7-4}_{x^2+4x+3}}$

$$\lim_{x\to -1} \frac{(\cancel{x+1})(\sqrt{x^2+4x+7}+2)}{(\cancel{x+1})(x+3)} = \frac{\sqrt{1-4+7}+2}{-1+3} = \frac{4}{2} = 2$$

(b) $\lim_{x\to -1^-} \dfrac{|x+1|}{x^2 - x - 2} = \lim_{x\to -1^-} \dfrac{-(\cancel{x+1})}{(x-2)(\cancel{x+1})} = \dfrac{-1}{-1-2} = \dfrac{1}{3}$