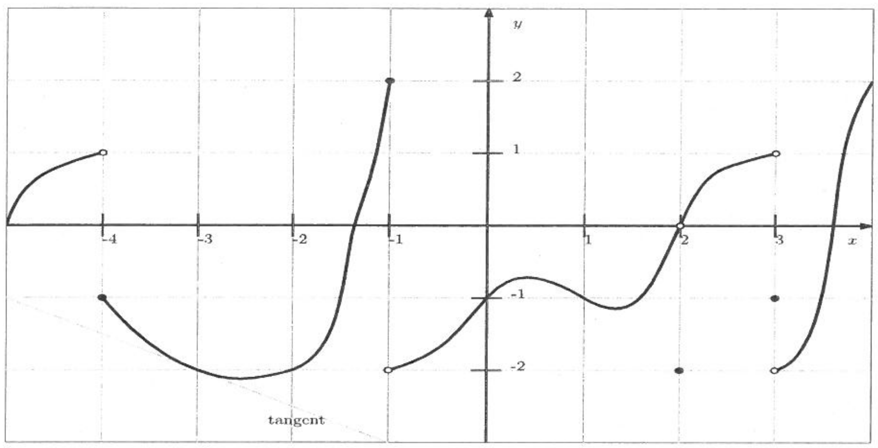
Math 1210: Quiz #2 Fall 2017

Name: Solution	A#:	Section: H

[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) $\lim_{x\to 3} f(x) =$ Does not exist

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

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

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

(f) $\lim_{x\to -1^+} sin^{-1}(x)f(x) =$ $\left(\lim_{x\to -1^+} \sin^{-1}(x)\right)\left(\lim_{x\to -1^+} f(x)\right) = -\frac{\pi}{2} \times -2 = \pi$

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

(h) The instantaneous rate of change of $f(x)$ when $x = -3$ $-\frac{1}{2}$

(i) The equation of the secant line over the interval $[-3, -1]$ $y = 2x+4$

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

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

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

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

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

$\lim_{x \to 1} \frac{-1}{3 + \sqrt{x+8}} = \frac{-1}{3+3} = -1/6$

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

$= \lim_{x \to -2^-} \frac{-1}{x-1} = 1/3$