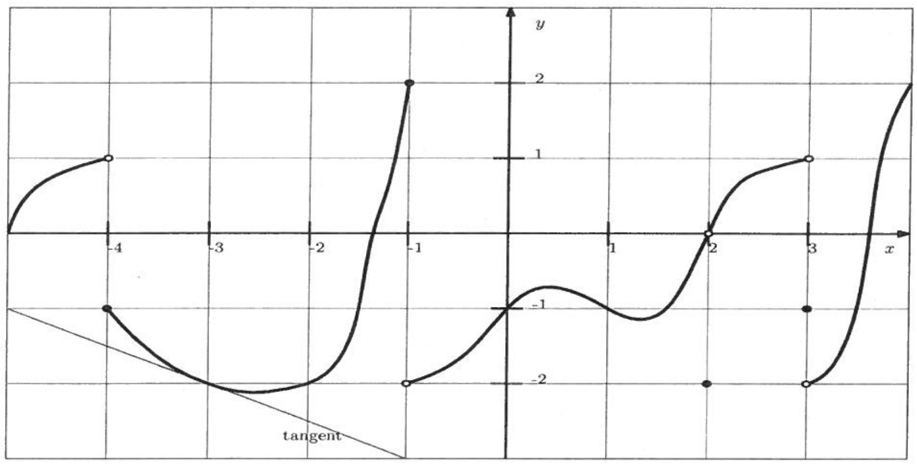
Math 1210: Quiz #2 **Fall 2017**

Name: SOLUTION	A#:	Section: A, B

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

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

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

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

(g) The average rate of change of $f(x)$ over the interval $[-3, -1]$ $= \frac{4}{2} = \boxed{2}$

(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 $[-3, -1]$ $y + 2 = 2(x+3)$

or $y = 2x + 4$

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

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

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

(and not $e^{1-2} = e^{-1}$!)

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

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

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

can skip these

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

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

$= \boxed{-\frac{4}{3}}$

(b) $\lim_{x\to 3^-} \frac{|x-3|}{x^2-x-6} = \lim_{x\to 3^-} \frac{-(x-3)}{(x-3)(x+2)} = \lim_{x\to 3^-} \frac{-1}{x+2} = \frac{-1}{3+2} = \boxed{-\frac{1}{5}}$