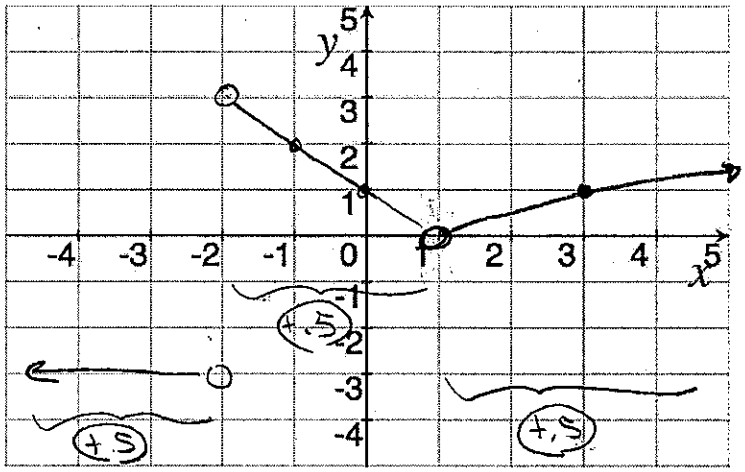
Key

TMATH 124am: Quiz 1

Show *all* your work (numerically, algebraically, or geometrically) for each and simplify. No credit is given without supporting work.

1. (§2.2 #12) Let $f(x) = \begin{cases} -3 & \text{if } x < -2 \\ -x+1 & \text{if } -2 < x < 1 \\ \log_3(x) & \text{if } 1 < x \end{cases}$

   (a) [2] *Carefully* graph f on the axis provided



endpoints (+.5)

   (b) [1]Determine the values of c for which $\lim_{x \to c} f(x)$ exists.

all values but when $\underbrace{c = -2}_{+.5}$

idea (+.5)

2. [2] (limit laws wks #5) Let $g(x) = x^2 - 2x$. Find the difference quotient of g at 3, that is find:

$$\lim_{h \to 0} \frac{g(3+h) - g(3)}{h}$$

(+.5) (+.5)

$$\lim_{h \to 0} \frac{[(3+h)^2 - 2(3+h)] - [3^2 - 2\cdot 3]}{h} = \lim_{h \to 0} \frac{[\cancel{9} + 6h + h^2 - \cancel{6} - 2h] - [3]}{h}$$

algebra (+.5)

$$= \lim_{h \to 0} \frac{[3 + 4h + h^2] - 3}{h} = \lim_{h \to 0} \frac{4h + h^2}{h} = \lim_{h \to 0} \frac{\cancel{h}(4+h)}{\cancel{h}}$$

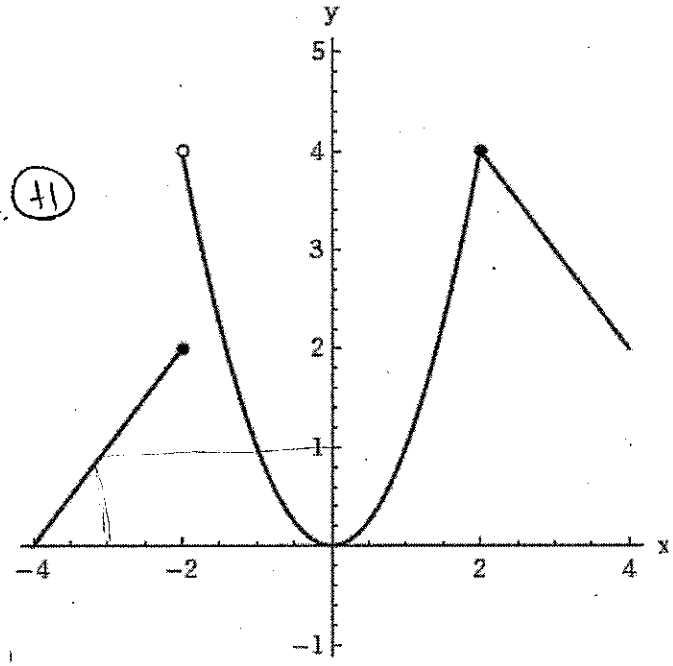
$$= \lim_{h \to 0} 4 + h = 4.$$

limit evaluate (+.5)

3. [5] (WebHW2 #6) For the function f whose graph is given, estimate the value of each quantity, if it exists.

(WebHW2 #2) $\lim_{x\to -3} f(x)$ 1

(+1)



(WebHW2 #2) $\lim_{x\to -2} f(x)$

Does not exist. (+1)

+.5 if 2 or 4

(WebHW1 #9) $f(-2)$

2 (+1)

+.5 if 4

(WebHW2 #2) $\lim_{x\to 4^-} f(x)$

2 (+1)

(WebHW3 #1) $\lim_{x\to -2^+} \left[\frac{1}{2}f(x) - 7\right] = \lim_{x\to -2^+} \frac{1}{2}f(x) - \lim_{x\to -2^-} 7$ (.5)

Limit Law #2

$= \frac{1}{2} \lim_{x\to -2^+} f(x) - 7$

Limit Law 5

$= \frac{1}{2}\underbrace{(4)}_{(+.5)} - 7 = 2 - 7 = -5$