

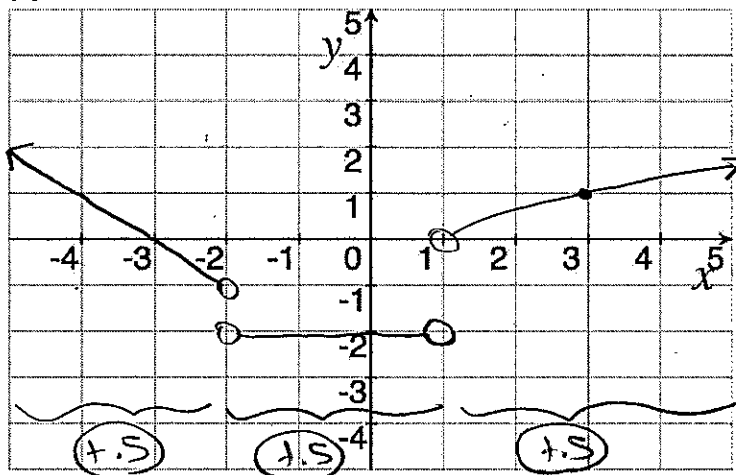
# TMATH 124pm: Quiz 1

*Key*

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

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

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



endpoints (1.5)

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

all values but when  $x = -2$  and  $x = 1$  idea (1.5)

2. [2] (limit laws wks #5) Let  $g(x) = x^2 - 2x$ . Find the difference quotient of  $g$  at 1, that is find:

$$\begin{aligned} & \lim_{h \rightarrow 0} \frac{g(3+h) - g(3)}{h} \\ &= \lim_{h \rightarrow 0} \frac{[(3+h)^2 - 2(3+h)] - [3^2 - 2 \cdot 3]}{h} = \lim_{h \rightarrow 0} \frac{[9 + 6h + h^2 - 6 - 2h] - [9 - 6]}{h} \\ &= \lim_{h \rightarrow 0} \frac{[3 + 4h + h^2] - [3]}{h} = \lim_{h \rightarrow 0} \frac{4h + h^2}{h} = \lim_{h \rightarrow 0} 4 + h \\ &= \lim_{h \rightarrow 0} 4 + h = 4 \end{aligned}$$

limit evaluate (1.5)

algebra (1.5)

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

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

1  
 (+1)

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

Does not exist (+1)

+5 if 2 or 4

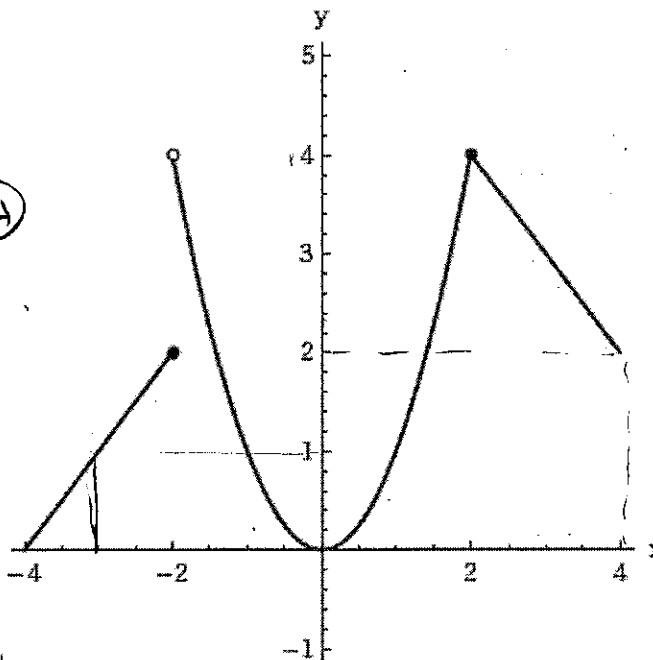
(WebHW1 #9)  $f(-2)$

2 (+1)

+5 if 4

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

2 (+1)



(WebHW3 #1)  $\lim_{x \rightarrow -2^+} \left[ \frac{1}{2}f(x) - 7 \right] = \lim_{x \rightarrow -2^+} \frac{1}{2}f(x) - \lim_{x \rightarrow -2^+} 7$  by limit laws

(+5)  $\left\{ \begin{aligned} &= \frac{1}{2} \lim_{x \rightarrow -2^+} f(x) - 7 && \text{by limit laws} \end{aligned} \right.$

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