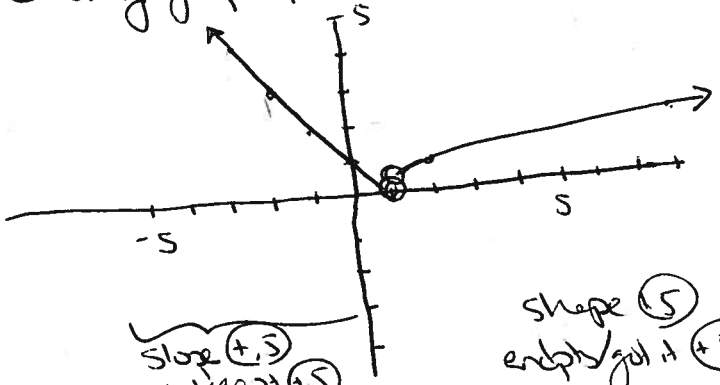
Quiz 1 Key

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

line with slope -1 and y-intercept 1

graph of $\log_3(x)$ horiz shifted right 1

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



slope (+.5) y-intrcpt (+.5)

shape (.5) endpt/gut it (+.5)

note $\log_3(1+1)$
$= \log_3(2)$
$= \frac{\log 2}{\log 3}$

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

all c but when c=1 (+.5) (+.5)

2)[2] find $\lim_{h\to 0} \frac{(3+h)^{-1} - 3^{-1}}{h}$

note: we can't plug 0 in for h because then would be a zero in the denominator

negexp (+.5) $= \lim_{h\to 0} \frac{\frac{1}{3+h} - \frac{1}{3}}{h}$

fractions (+.5) $= \lim_{h\to 0} \frac{\frac{3}{3(3+h)} - \frac{3+h}{3(3+h)}}{h}$

algebra (+.5)

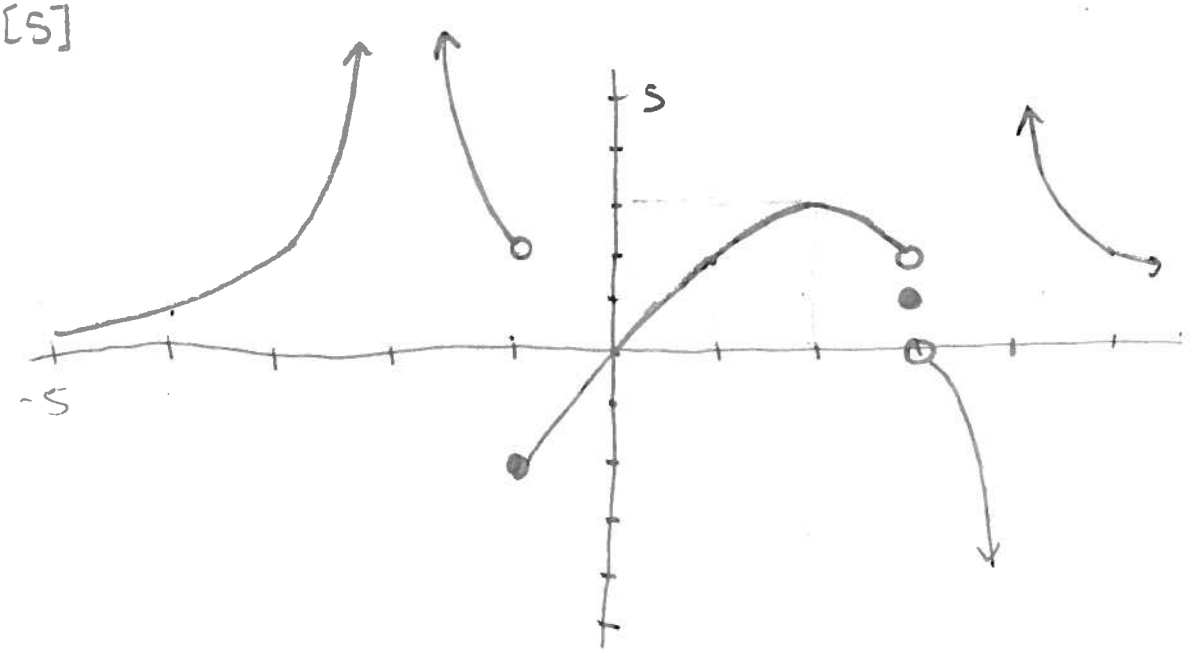
subtraction (+.5) $= \lim_{h\to 0} \left[\frac{-h}{3(3+h)}\right] \div \frac{h}{1}$

$= \lim_{h\to 0} \left[\frac{-h}{3(3+h)}\right] \cdot \frac{1}{h}$

$= \lim_{h\to 0} \frac{-1}{3(3+h)}$

$= \frac{\lim_{h\to 0} -1}{\lim_{h\to 0} 3(3+h)} = \frac{-1}{3(3+0)} = \frac{-1}{9}$

3) [5]



$\lim_{x \to 1} f(x) = 2$ (1)

$\lim_{x \to -2} f(x) = \infty$ (1)

$f(3) = 1$ (1)

$\lim_{x \to 3^+} f(x) = 0$ if 2 +.5

$\lim_{x \to -3} \sqrt{8 f(x)} = \sqrt{\lim_{x \to -3} (8 f(x))}$ limit law (+.5)

$= \sqrt{8 \lim_{x \to -3} f(x)}$

$= \sqrt{8 \cdot 2}$

$= \sqrt{16} = 4$ get it (+.5)