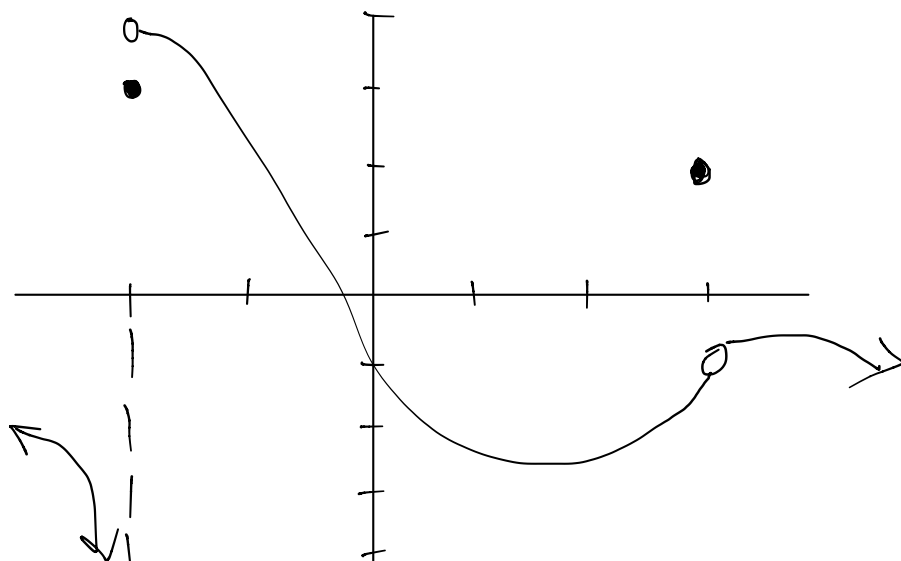**Your Name:** *Key*

Calculus I, Math 151-06, Quiz #1

1. **[11 points total]**

   (a) **[7 points]** Sketch a graph of a function $f(x)$ which has all of the following properties:

   $$\lim_{x \to -2^-} f(x) = -\infty \qquad \lim_{x \to -2^+} f(x) = 4 \qquad f(-2) = 3$$

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

   (b) **[4 points]** Evaluate $\lim_{x \to -2} f(x)$ and $\lim_{x \to 3} f(x)$.

   $$\lim_{x \to -2} f(x) \quad \text{DNE}.$$

   $$\lim_{x \to 3} f(x) = -1.$$

2. **[14 points total]** Evaluate the following limits.

(a) **[6 points]** $\lim\limits_{t \to -1} \dfrac{\sqrt{3-t}-2}{t+1}$ $= \dfrac{\sqrt{4}-2}{-1+1} = \dfrac{0}{0}$

$$= \lim_{t \to -1} \frac{(\sqrt{3-t}-2)(\sqrt{3-t}+2)}{(t+1)(\sqrt{3-t}+2)} = \lim_{t \to -1} \frac{3-t-4}{(t+1)(\sqrt{3-t}+2)} = \lim_{t \to -1} \frac{-t-1}{(t+1)(\sqrt{3-t}+2)}$$

$$= \lim_{t \to -1} \frac{-1(t+1)}{(t+1)(\sqrt{3-t}+2)} = \lim_{t \to -1} \frac{-1}{\sqrt{3-t}+2} = \frac{-1}{\sqrt{4}+2} = \boxed{\frac{-1}{4}}$$

(b) **[8 points]** $\lim\limits_{h \to 0} \dfrac{f(4+h)-f(4)}{h}$, where $f(x) = \dfrac{2}{x}$.

$$= \lim_{h \to 0} \frac{\frac{2}{4+h} - \frac{2}{4}}{h} = \frac{\frac{2}{4} - \frac{2}{4}}{0} = \frac{0}{0}$$

$$= \lim_{h \to 0} \frac{\frac{2(4)}{(4+h)(4)} - \frac{2(4+h)}{(4+h)(4)}}{h} = \lim_{h \to 0} \frac{\frac{8}{4h+16} - \frac{8+2h}{4h+16}}{h} = \lim_{h \to 0} \frac{\frac{-2h}{4h+16}}{h/1}$$

$$= \lim_{h \to 0} \frac{-2h}{4h+16} \cdot \frac{1}{h} = \lim_{h \to 0} \frac{-2}{4h+16} = \frac{-2}{16} = \boxed{\frac{-1}{8}}$$