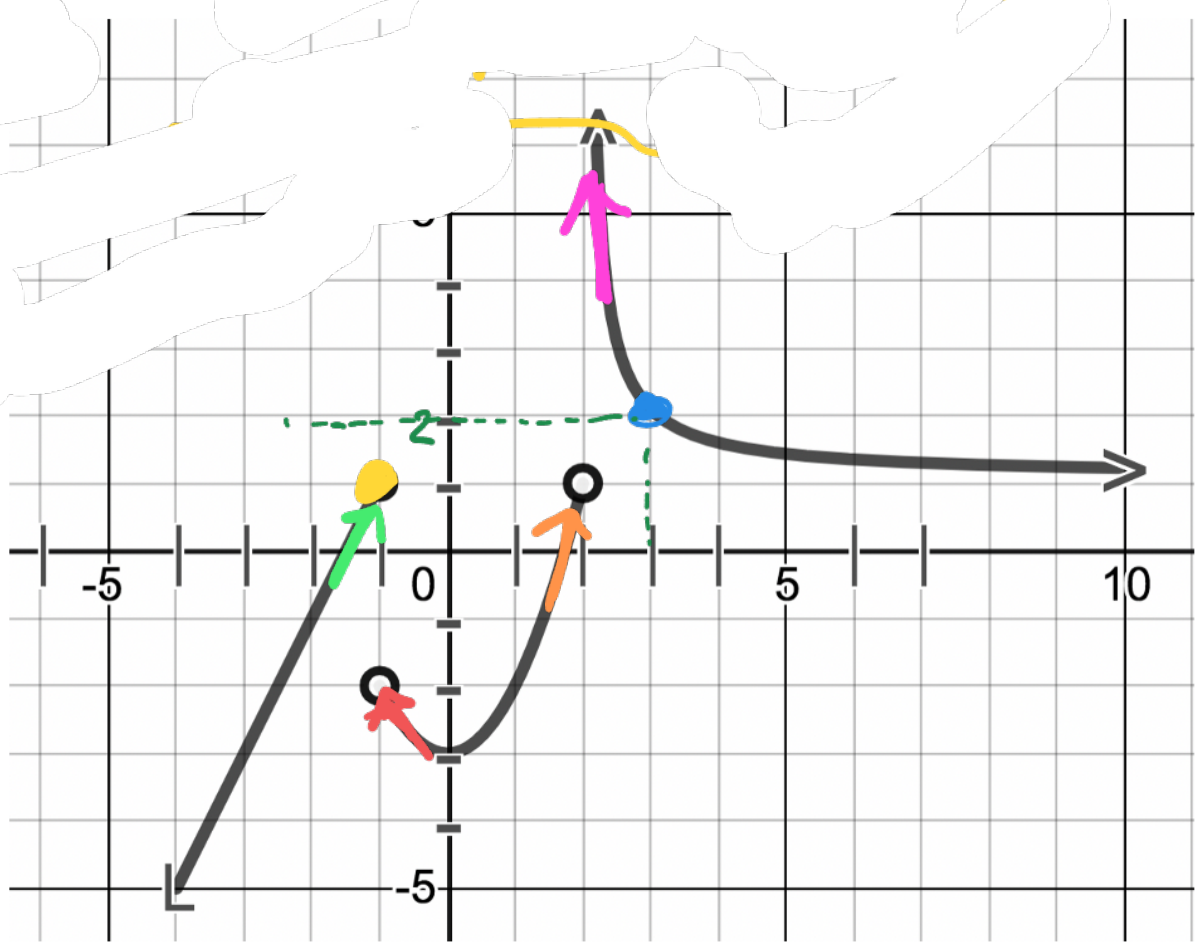
Math 5A Quiz 1.5 and 1.7

Show all work neatly with clear presentations.

(1) Given the graph of f(x) below, find the following (4 points)



(a) $\lim_{x \to 3} f(x) =$ 2.

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

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

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

(two one sided limits do not agree)

(e) $\lim_{x \to 2^+} f(x) =$ ∞.

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

(g) $f(-1) =$ 1

(h) find c so that $f(c) = 2$ 3

Find x value corresponding to a y value of 3

2) Using your calculator or computer, create 2 tables (one from the left of 9, the other from the right) similar to the one below, to estimate $\lim_{x\to 9}\dfrac{x-9}{3-\sqrt{x}}$ (4 points)

(You may use the computer, but cut and paste a screen shot showing your numbers.

$x \to 9^-$

x_1	$f(x)$
8.5	
8.9	
8.999	
8.99999	
----	

find

$x \to 9^+$

x_1	$f(x_1)$
9.5	
9.1	
9.001	
9.0001	

show these values

Use your tables to estimate Limit -6

---

3) Find the following infinite limits (without using a table of values) Show work.

a) $\lim_{x\to 3^+}\dfrac{x+9}{3-x} = -\infty$

Be careful with notation here. The notation $\frac{12}{0}$ is not a real #

$\frac{12}{0}$ $<^{+\infty}_{-\infty}$

sign: $\frac{+}{-}$

b) $\lim_{x\to 2}\dfrac{5}{x^2-4x+4} = \infty$

$= \lim_{x\to 2}\dfrac{5}{(x-2)^2} =$

$\frac{5}{0}$ $\frac{+}{+}$

(4 points)

---

4) Sketch the graph of the function and use it to determine all values of a for which $\lim_{x\to a} f(x)$ does not exist. $\leftarrow a=-2$

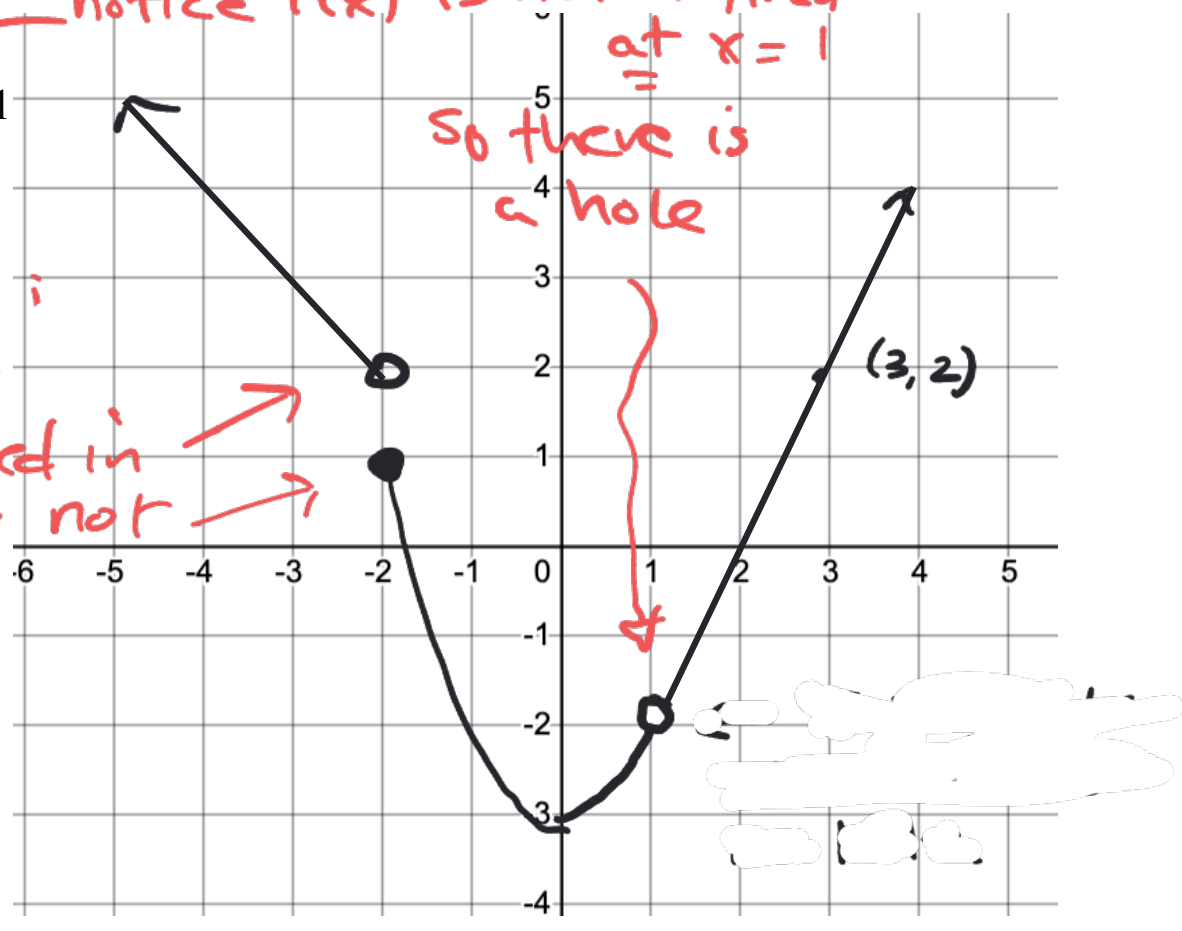
(4 points)

$$f(x)=\begin{cases} 2x-4 & \text{if } x>1 \\ x^2-3 & \text{if } -2\le x<1 \\ |x| & \text{if } x<-2 \end{cases}$$

notice f(x) is not defined at $x=1$

so there is a hole

Make sure which points are filled in or not



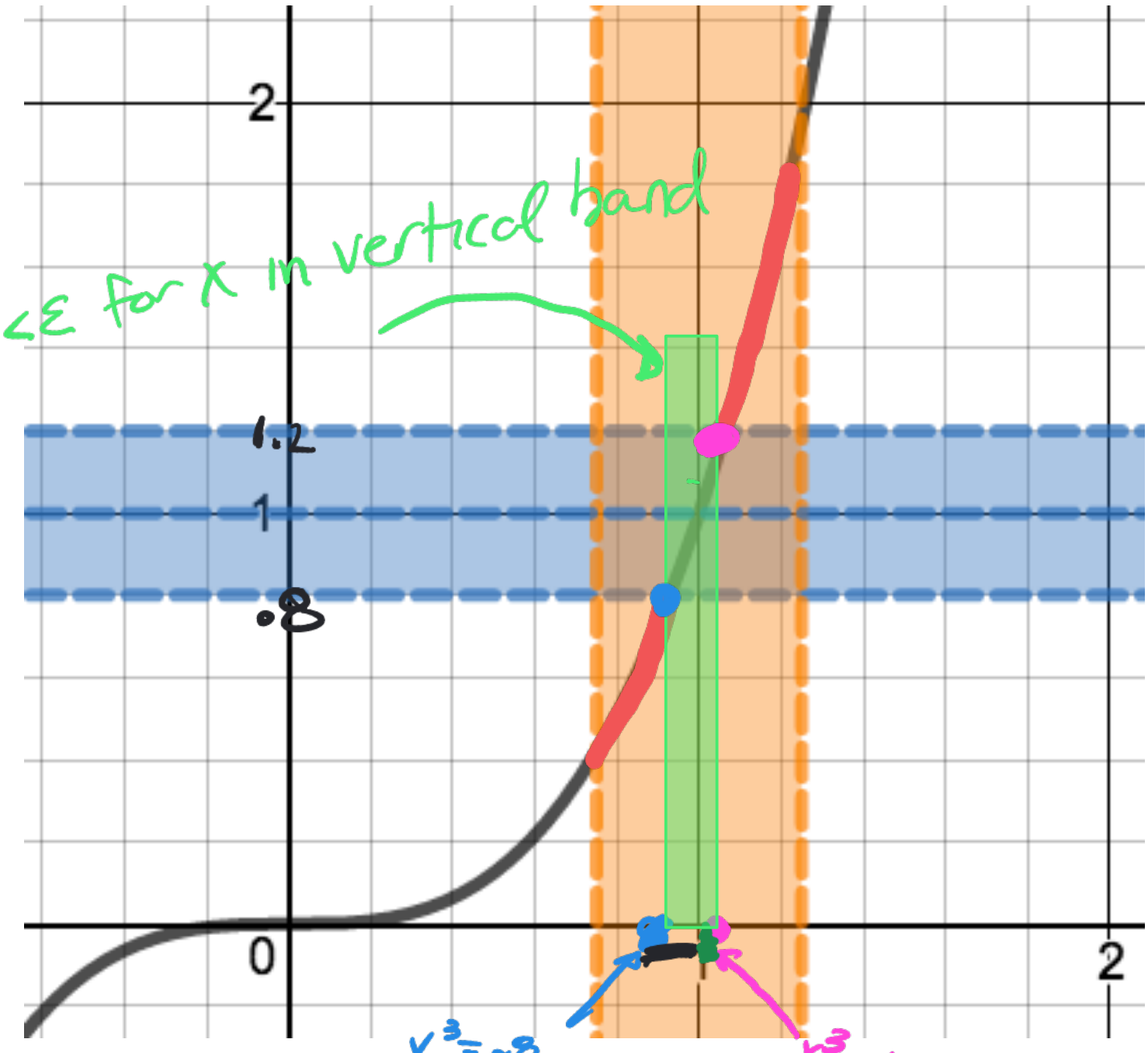
See example in 1.7 video

(5) Suppose you were trying to prove that $\lim_{x\to 1} x^3 = 1$ (4 points)

The graph below depicts $f(x) = x^3$ with $\varepsilon = 0.2$ and $\delta = 0.2$ (where ε and δ are as described in the definition of limit). (Note: you should be able to recreate such a graph by hand if given $f(x), a, \varepsilon, \delta$ on the exam)

Does this value of δ satisfy the definition for the given ε? NO (see red on graph)

If not, compute a value of δ that would work. Show thought process.



$|f(x)-1| < \varepsilon$ for x in vertical band

$x^3 = .8$

$x_1 = \sqrt[3]{.8}$

$x_2^3 = 1.2$

$x_2 = \sqrt[3]{1.2}$

So δ is the smaller of δ_1 and δ_2 $= \min\{1-\sqrt[3]{.8}, \sqrt[3]{1.2}-1\}$

$\delta_1 = 1-\sqrt[3]{.8}$ $\delta_2 = \sqrt[3]{1.2}-1$

$\delta = .06$ works