PRINT

Outline

Quiz 1 + key

Roster ✓

Outline

- Reminders
  - WebAssign : Register ASAP, HW due tonight
  - Quick Checks before class

- Activity

-1.5 : common sense (20 min) 4:30 - 4:50

In Groups : # 1, 2, 3 (10 min)

Go over together (10 min)

- Limit Notation (15 min) 4:50 - 4:55

-1.5 : Apps - Graphs 4:55 - 5:20

In Groups : # 1 (5 min)

Go over together (5 min)

Individual : # 2 (5 min)

Partner-up & trade + check (5 min)

Go over together (5 min)

5 min break (5 min) 5:20 - 5:25

Individual : # 3 (5 min) 5:25 - 5:40

Partner-up & trade + check (5 min)

Go over together (5 min)

- Assigned → All

- WebAssign : HW 2.2 & 2.2b

- Lessons + Quick Checks (past)

future

↳ Get ahead!!

Activity 3

S1.S : Limits — Common Sense Approach

Work on the following (#1, 2, 3) in your groups (10 min).
Then, we will go over as a class.

1. $\lim_{x \to 2} \frac{2^x - 1}{3x^2}$

$= \frac{2^{(\text{close to } 2)} - 1}{3(\text{close to } 2)^2} \longrightarrow \frac{4-1}{3(4)} : \frac{3}{12} = \frac{1}{4}$

$$\lim_{x \to 2} \frac{2^x - 1}{3x^2} = \frac{1}{4}$$

2. Suppose f is defines as:

$$let\ f(x) = \begin{cases} x^x & x < 4 \\ 4 & x = 4 \\ 3x^2 + 2x & x > 4 \end{cases}$$

Find $\lim_{x \to 4} f(x)$

$x = 4$, ~~$\lim_{x \to 4} f(x) = 4$~~ → NO!

↳ Remember: NO relationship between limits and outputs!!

Approach 4 from both sides:

As $x \to 4^-$, $x^x \longrightarrow 4^4 = 256$

As $x \to 4^+$, $2x^2 + 2x \longrightarrow 3(4)^2 + 2(4) = 3(16) + 2(4) = 56$

$256 \neq 56$

so. $\lim_{x \to 4} f(x) = DNE$

3. Suppose f is defines as:

$$let\ f(x) = \begin{cases} x^2 + 2 & x < -1 \\ 4 & -1 \le x < 1 \\ \log(x) + 2 & x \ge 1 \end{cases}$$

a. *Find* $\lim_{x \to -1^-} f(x)$

b. *Find* $\lim_{x \to 1^+} f(x)$

(a) As $x \to -1^-$, $x^2 + 2 \to (-1)^2 + 2 = 3$ $\quad \lim_{x \to -1^-} f(x) = 3$

(b) As $x \to 1^+$, $\log x + 2 \to \log(1) + 2 = 2$ $\quad \lim_{x \to 1^+} f(x) = 2$

$\log_{10}(1) = ?$

$10^{?} = 1 \quad ? = 0$

Evolving Intuition & Expression : $\lim_{x \to a} f(x)$

(1) t-chart

x	f(x)
a	?

$\lim_{x \to a^-} f(x)$

$\lim_{x \to a^+} f(x)$

$\Rightarrow \lim_{x \to a} f(x)$

(2) "close to" approx : Plug in value "close to a":

$\lim_{x \to a} f(x) = f(\text{close to } a)$

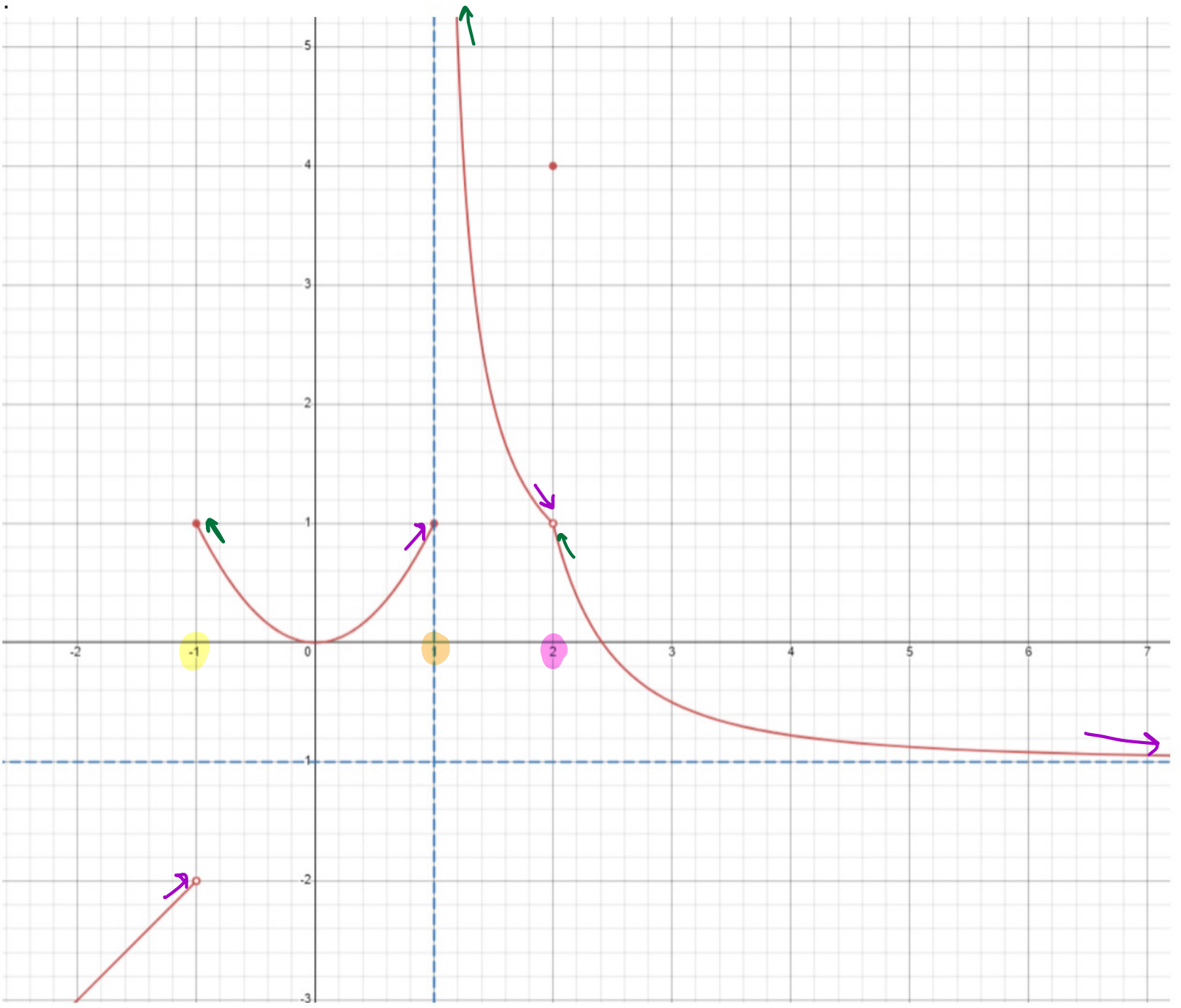
(3) Arrow notation: As $x \to a$, $f(x) \to f(a)$

↑ what we've built to — use this

S1.5 | Limits | One - Sided Limits | Applications: Constructing Graphs

1. Interpret the limit from the graph:

Work on in groups (5 min)
Then go over as a class



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

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

c. $\lim_{x \to 1^+} f(x)$ $+\infty$

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

e. $f(2)$ 4

f. $\lim_{x \to \infty} f(x)$ *(this is a future thing but cool to think about)* 1

(HA : $y = 1$)

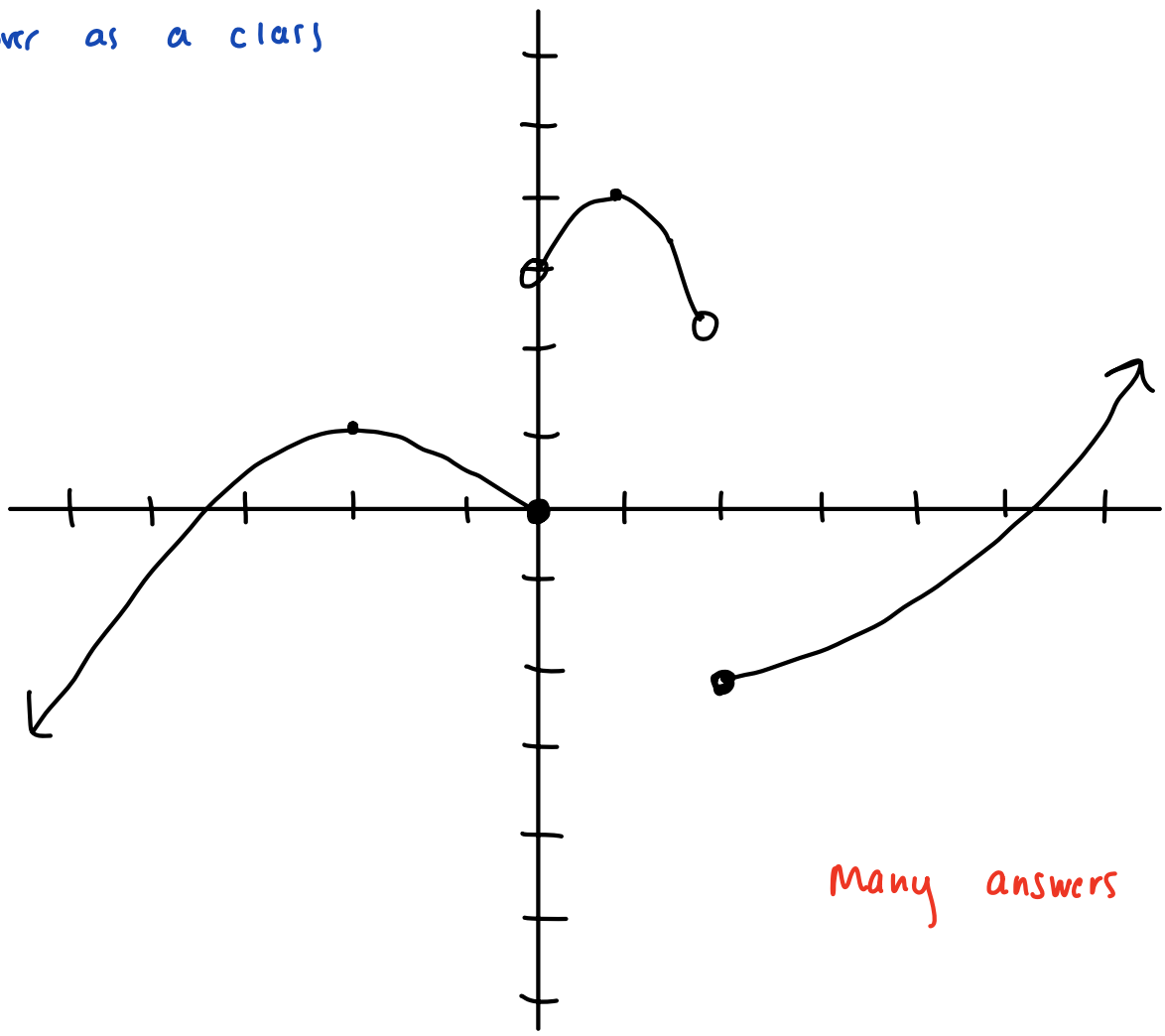
2. Instruction: Construct a graph that satisfies the following conditions:
   - $\lim_{x \to -2} f(x) = 1$
   - $\lim_{x \to 1^+} f(x) = 4$
   - $\lim_{x \to 2^-} f(x)$ *exists*, but $\lim_{x \to 2} f(x)$ *DNE*
   - $f(0) = 0$ & $\lim_{x \to 0} f(x)$ *DNE*
   - *F(x)* is defined for all *x*

(1) Try individually (5 min)

(2) Partner up & trade graphs

(3) Check to see if your partner's graph satisfies the conditions
If not, explain what is off. (5 min)

Go over as a class



Many answers possible!!

3. Instruction: Construct a graph that satisfies the following conditions:

- *Domain: All real numbers*
- $\lim_{x \to -1} f(x) = 1$
- $\lim_{x \to 0^+} f(x) = 4$ but $\lim_{x \to 0} f(x)$ *DNE*
- $f(0) = 0$
- $\lim_{x \to 1} f(x) = \infty$
- $\lim_{x \to \infty} f(x) = -2$

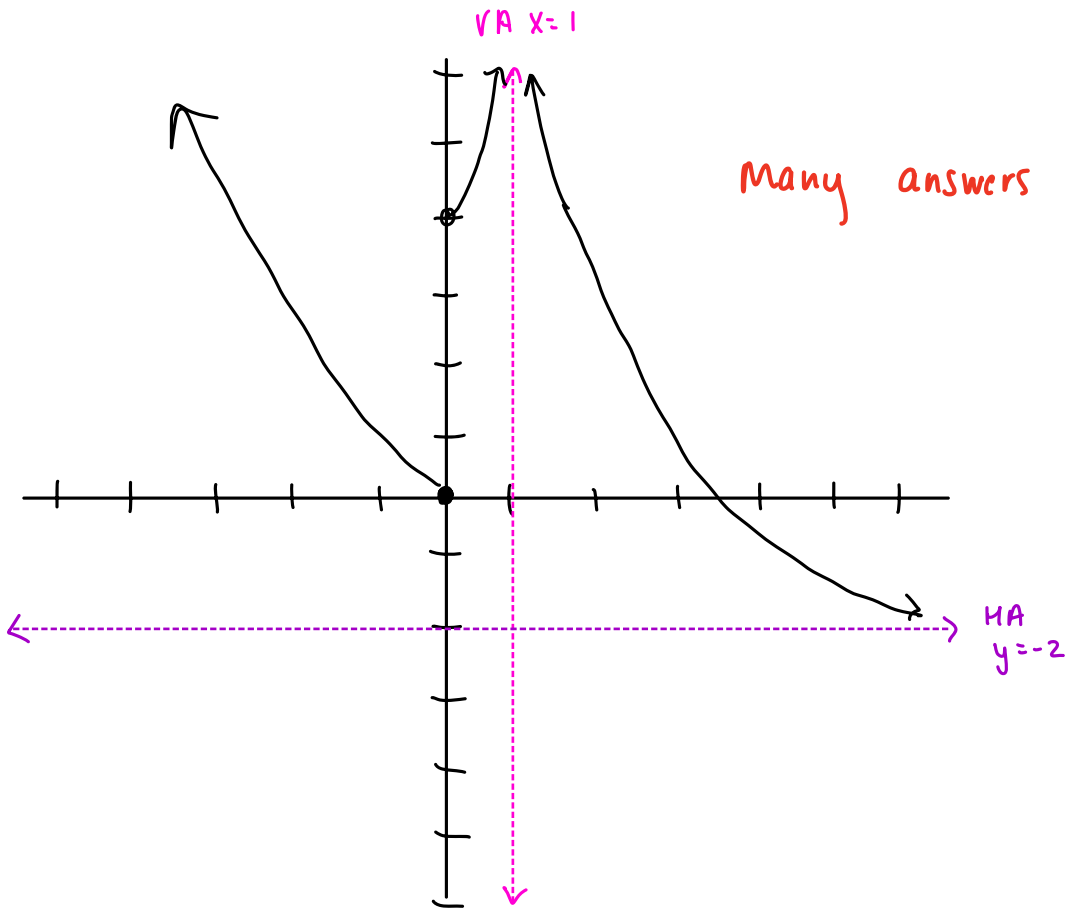
(1) Try individually (5 min)

(2) Partner up & trade graphs

(3) Check to see if your partner's graph satisfies the conditions

If not, explain what is off. (5 min)

Go over as a class



Many answers possible!!