NOTES – Piecewise Functions

- Function built out of multiple pieces. (Think about cut + paste)

$f(x)=\begin{cases} \text{what if where} \\ \text{function if domain} \end{cases}$ — Remember $< >$ = open circle, $\leq \geq$ = closed circle

Example 1:

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

① ② ③ → just a point $(-1,\ )$

which domain is it in?

A. Find $f(-2)$ $-4\leq -2<-1 \Rightarrow$ Use $\frac{1}{2}x-3$

$\frac{1}{2}(-2)-3=-1-3=$ **−4** Point $(-2,-4)$

B. Find $f(-1)$ $-1=-1 \Rightarrow$ Use 2

2 Point $(-1,2)$

C. Find $f(2)$ $2>-1 \Rightarrow$ Use x^2

$(2)^2=$ **4** Point $(2,4)$

D. Graph the function

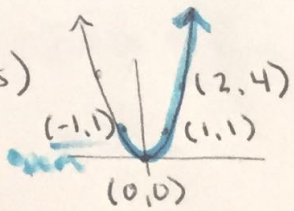
Helpful Hint: Think about the endpoints and the shape/function family. For linear, can use slope + y-intercept, but that may be hard if 0 isn't in the domain

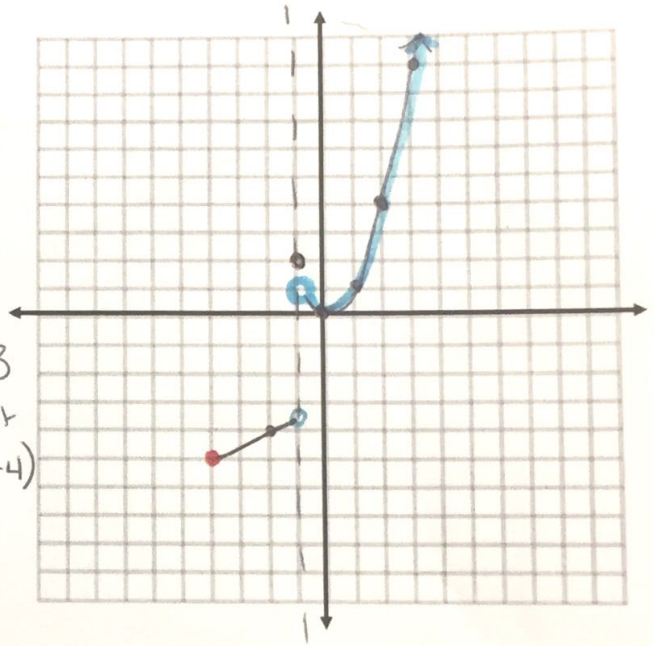
① Linear · endpoints $(-4,-5)$ (closed) and $(-1,-3.5)$ (open)

$\frac{1}{2}(-4)-3=-2-3=-5$ $\quad \frac{1}{2}(-1)-3=-\frac{1}{2}-3=-3.5$

② Just the point $(-1,2)$

③ Parabola (no transformations)



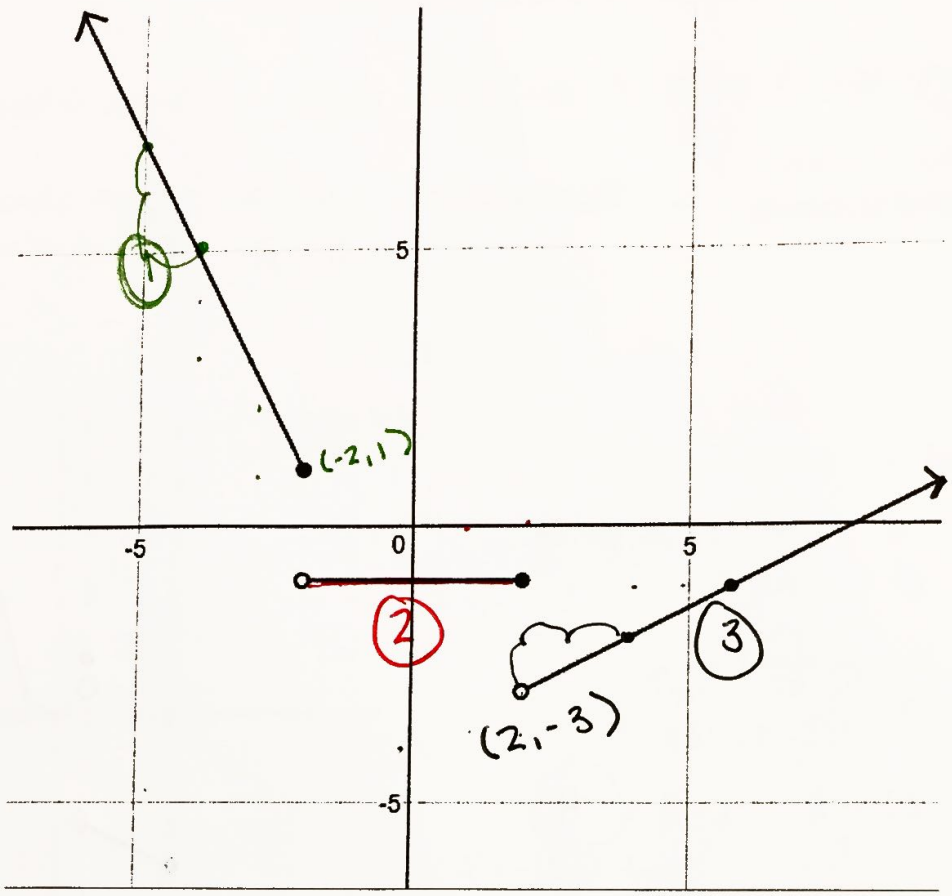


E. Is the graph continuous?

Can trace the whole thing without picking up your pencil

NO

Example 2: Give the piecewise function for the graph shown.



Hints for linear functions:

- Find slope (M)
- Find y-intercept (b) - Plug in a point / trace back / point-slope + solve for y

① $M = -2$ $(-2, 1)$

$1 = -2(-2) + b$

$1 = 4 + b$

$b = -3$

③ $M = \frac{1}{2}$ Point $(2, -3)$

$-3 = \frac{1}{2}(2) + b$

$-3 = 1 + b$

$b = -4$

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