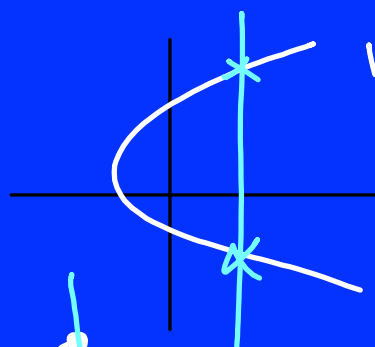
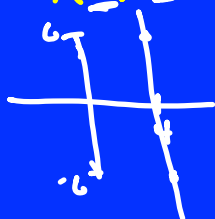


# FUNCTIONS

Each x-coord. is paired with exactly 1 y-coord.

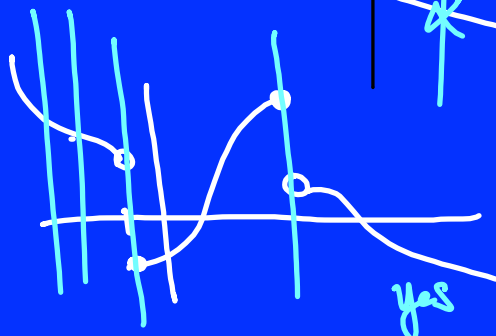
is paired with EXACTLY one y-coord. (cannot repeat x-coord.)

$\{(-2, 3), (4, -6), (5, 2), (8, -3), (4, 6)\}$  Not a func



Vertical line test

No



Yes

$$f(x) = 3x^2 - 7x + 9$$

$$f(-2) = 3(-2)^2 - 7(-2) + 9$$

$$= 12 + 14 + 9$$

$$= 35$$

$$(-2, 35)$$

$$f(x) = \begin{cases} x^2 - 4 & x < 1 \\ \frac{2}{x+1} & 1 \leq x \leq 5 \\ 3 & x > 5 \end{cases}$$

Piecewise function

$$f(0) = 0^2 - 4 = -4$$

$$f(7) = 3$$

Is this a function?

yes

$$y = 3x^3 + 2$$

$$\begin{array}{r} 1 \overline{) 5} \\ 10 \overline{) 3002} \end{array}$$

No

$$y = \pm \sqrt{x-4}$$

$$\begin{array}{r} 5 \overline{) \pm 1} \end{array}$$

No

$$6x + y^2 = 1$$

$$\sqrt{y^2} = \sqrt{1-6x}$$

$$y = \pm \sqrt{1-6x}$$

$$(x)^2 = (\sqrt{y})^2$$

$$x^2 = y$$

$$|y| = 4x + 3$$

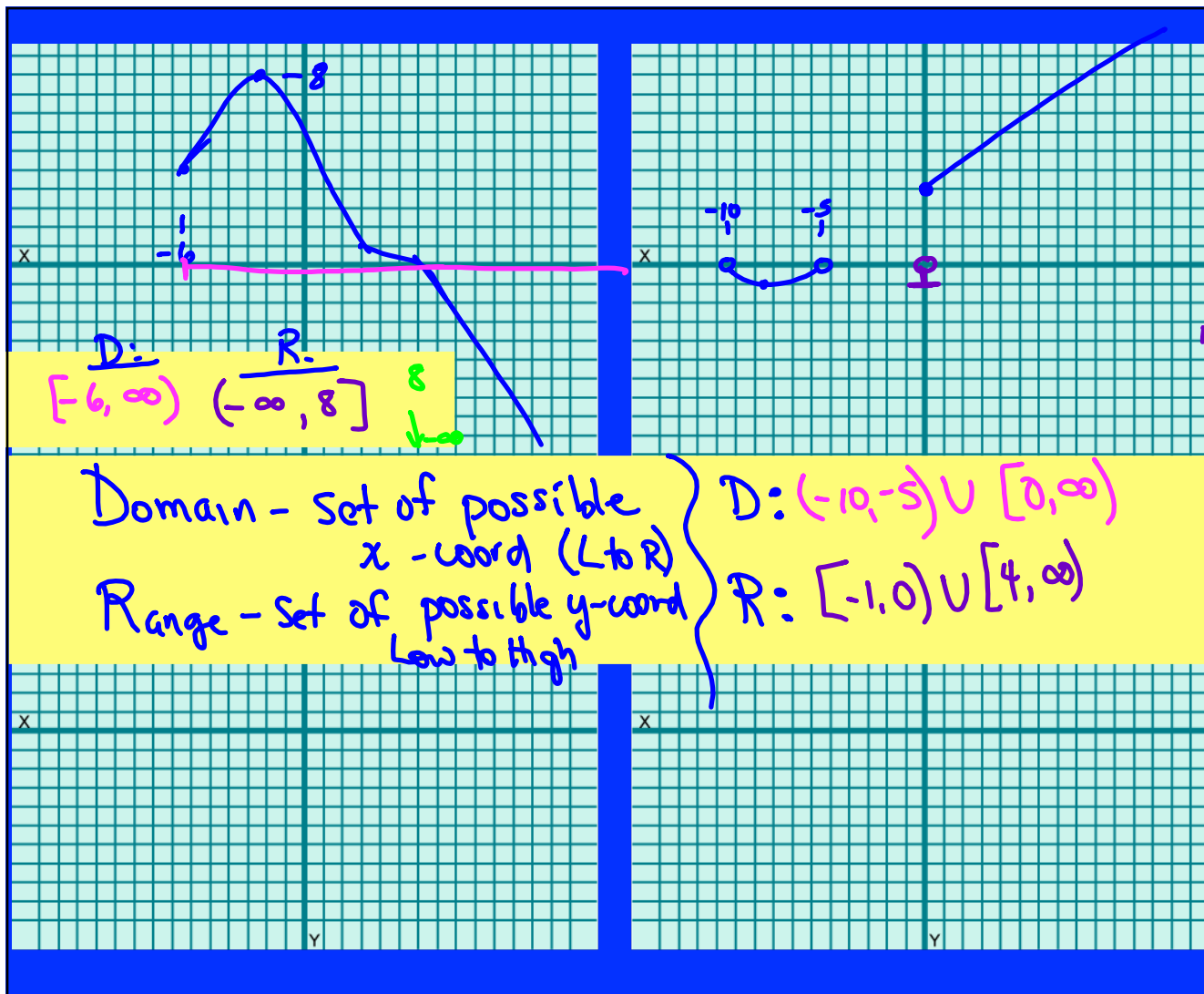
$$|y| = 7$$

No

$$\begin{array}{r} 1 \overline{) \pm 7} \end{array}$$

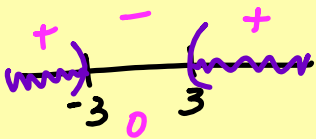
Not a func  
if:

- 1)  $\pm$
- 2)  $y_{\text{even}}$
- 3)  $|y|$



|                                                     |                                                                                            |                                                                               |
|-----------------------------------------------------|--------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|
| <u>Type</u><br>Polynomial<br>$4x^3 + 3x^2 - 7x + 1$ | Domain Restrictions<br>None                                                                | Method to Solve<br>$\mathbb{R}$ or $(-\infty, \infty)$                        |
| Rational<br>$f(x) = \frac{x+3}{3x-5}$               | Denom $\neq 0$<br>$3x-5=0$<br><del><math>x = \frac{5}{3}</math></del> $x \neq \frac{5}{3}$ | set denom = 0<br>+ solve.<br>$x \neq - , -$                                   |
| Even Root<br>$\sqrt{x-4}$                           | Root must contain<br>+ Value                                                               | Testing Points<br>$\frac{-}{0} \frac{+}{4} \frac{+}{\infty}$<br>$[4, \infty)$ |
| Odd Root<br>$\sqrt[3]{x-4}$                         | None                                                                                       | $\mathbb{R}$ or $(-\infty, \infty)$                                           |

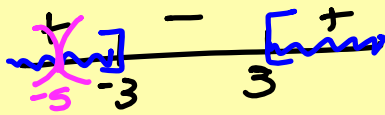
$$f(x) = \frac{x+5}{\sqrt{x^2-9}} \leftarrow 0$$



$$D: (-\infty, -3) \cup (3, \infty)$$

Always  
Test Points  
first!

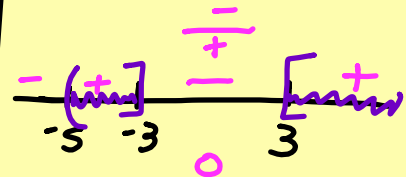
$$g(x) = \frac{\sqrt{x^2-9}}{x+5}$$



$$(-\infty, -5) \cup (-5, -3] \cup [3, \infty)$$

Test only what  
is in the even  
root!

$$h(x) = \sqrt{\frac{x^2-9}{x+5}} \quad \begin{matrix} (x+3) \\ (x-3) \end{matrix}$$



$$(-5, -3] \cup [3, \infty)$$