

FUNCTIONS + DOMAIN

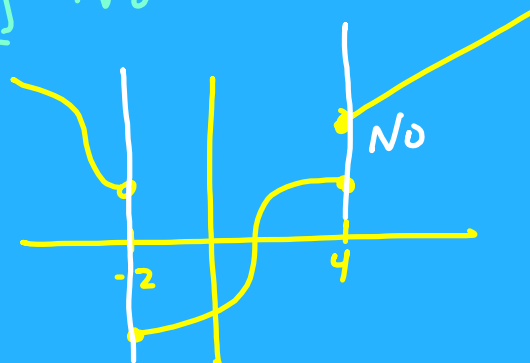
Function - Each x-coord is paired with EXACTLY one y-coord

$\{(-2, 3), (4, -6), (5, -2), (8, -3), (9, 6)\}$ No

$\{(4, 6), (5, 6), (10, 6)\}$ yes



vertical line test



piecewise function

Is this a function?

$$y = 3x^2 + 2 \quad \text{yes}$$

$$y = \pm \sqrt{x} \quad \text{No}$$

$$6x + y^2 = 1 \quad \text{No}$$

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

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

$$x^2 = y - 1$$

$$x^2 + 1 = y \quad \text{yes}$$

Not a function if

1) \pm

2) y^{even}

3) $|y|$

$$y = |2x - 5| \quad \text{yes}$$

$$y = |5|$$

$$y = 5$$

$$|y| = x + 4$$

$$|y| = 2 \quad \text{No}$$

$$y = -2 \text{ or } y = 2$$

Function Notation

$$f(x) = 3x^2 - 7x + 1$$

$$f(-2) = 3(-2)^2 - 7(-2) + 1$$

$$= 12 + 14 + 1$$

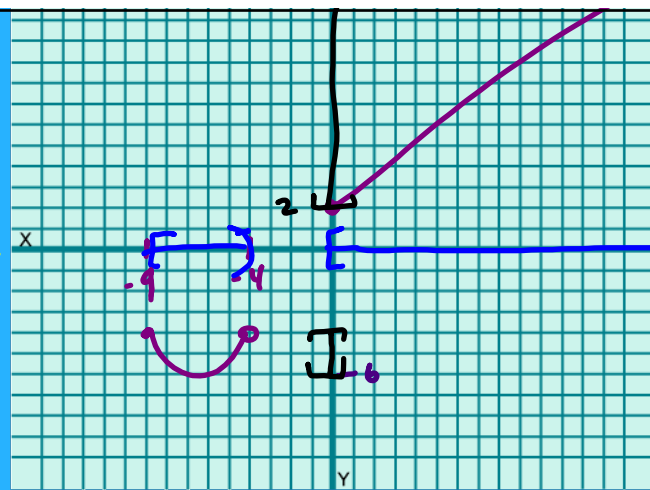
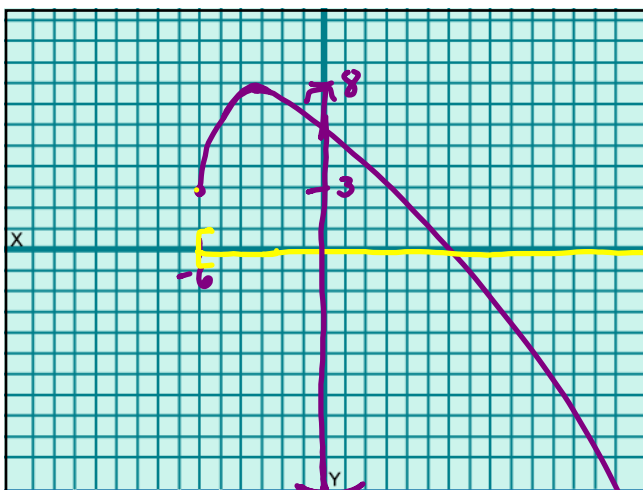
$$= 27$$

$$(-2, 27)$$

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

$$f(7) = \frac{2}{7+1} = \frac{2}{8} = \frac{1}{4}$$

$$f(2) = 3$$



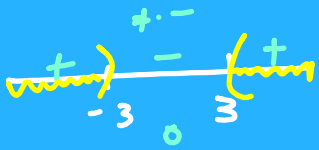
Domain - set of x-word L to R
 Range - set of y-word low to high
 $D: [-6, \infty)$ $R: (-\infty, 8]$

$D: [-9, 4) \cup [0, \infty)$
 $R: [-6, -4] \cup [2, \infty)$

Type of Func.	Domain Restrictions	Method to Solve
Polynomial $y = 2x^5 + 3x^3 - 2x + 5$	None	\mathbb{R} or $(-\infty, \infty)$
Rational $y = \frac{x+4}{x^2-25}$	Denom $\neq 0$	Set denom = 0, factor, or solve $x^2 - 25 = 0$ $(x+5)(x-5)$ $x = -5, 5$ $x \neq -5, 5$
Odd Root $y = \sqrt[3]{x-7}$ $\sqrt[3]{-8}$	None	\mathbb{R} or $(-\infty, \infty)$
Even Root $y = \sqrt{x+8}$ $\sqrt{-4}$	Must contain + values	Test Points to find + values $\frac{-}{-8} \frac{+}{[-8, \infty)}$

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

$$(x+3)(x-3)$$



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

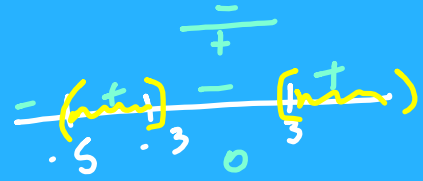
$$g(x) = \frac{\sqrt{x^2-9}}{x+5}$$

$x \neq -5$



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

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



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

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