Precalculus Name: _____

Notes 1.2 (Part 1)

Goal #1: Students will be able to identify the domain and range of a function from a given graph.
Goal #2: Students will be able to use both interval and inequality notation.
Goal #3: Students will be able to identify the domain of a function given only the equation of the function.

Identifying a Function

Domain: set of all input values ; x-values

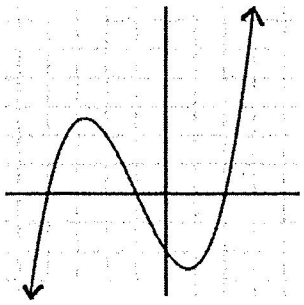
Range: set of all output values ; y-values → based upon the domain

What is a function? a relation in which every x-value is paired with exactly 1 y-value

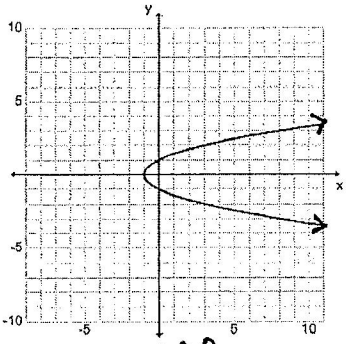
Function Notation: $f(x)$ "f of x" same as y

Function vs. Not a Function: use VLT ; check to make sure no x-values repeat

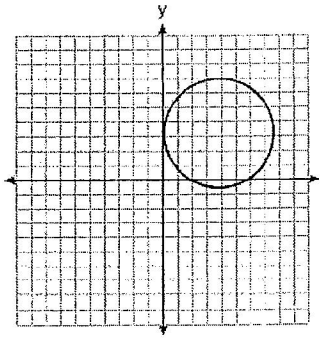
Determine if the following are functions:



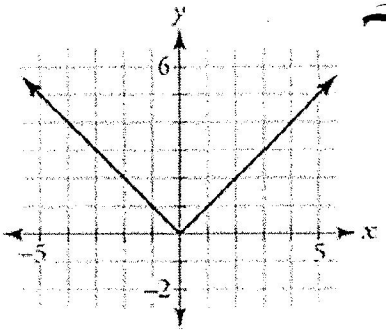
yes



no



no



yes

Determine if the following are functions from the equation. (Hint: solve for y)

1. $xy = 4$
$\frac{xy}{x} = \frac{4}{x}$ yes
$y = \frac{4}{x}$

2. $x^2 + y^2 = 1$
yes

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

4. $y = x^3 - 3x$
yes

5. $\frac{x}{1} = \frac{2}{y}$ yes
$xy = 2$
$\frac{xy}{x} = \frac{2}{x}$ $y = \frac{2}{x}$

6. $y^2 = 1 - x^2$
$y = \pm\sqrt{1-x^2}$ no

7. $y = \pm\sqrt{1-2x}$ no

8. $x^2 + y = 6$
$y = -x^2 + 6$ yes

9. $x + 2y^2 = 8$ no

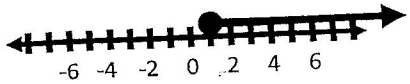
Using interval and inequality notation

When you want to include a number at the end of an interval you would use "[" or "]" ≤ ≥

When you want to exclude a number at the end of an interval you would use "(" or ")" < >

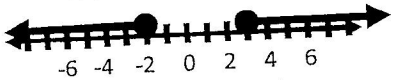
You should already be familiar with the following symbols used for inequality notation: <, >, ≤, ≥

Describe the shaded interval for each of the following (use BOTH inequality and interval notation):

a) 

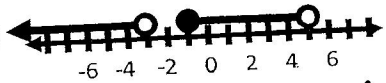
Inequality Notation: $x \geq 1$

Interval Notation: $[1, \infty)$

b) 

Inequality Notation: $x \leq -2$ OR $x \geq 3$

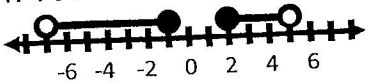
Interval Notation: $(-\infty, -2] \cup [3, \infty)$

c) 

Inequality Notation: $x < -3$ OR $-1 \leq x < 5$

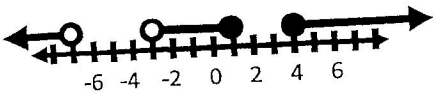
Interval Notation: $(-\infty, -3) \cup [-1, 5)$

NOW YOU TRY:

d) 

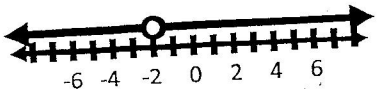
Inequality Notation: $-7 < x \leq -1$ OR $2 \leq x < 5$

Interval Notation: $(-7, -1] \cup [2, 5)$

e) 

Inequality Notation: $x < -7$ OR $-3 < x \leq 1$ OR $x \geq 4$

Interval Notation: $(-\infty, -7) \cup (-3, 1] \cup [4, \infty)$

f) 

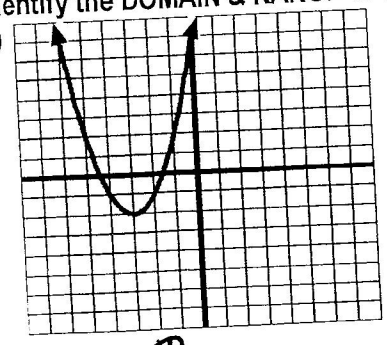
Inequality Notation: $x < -2$ OR $x > -2$ all real #'s $x \neq -2$

Interval Notation: $(-\infty, -2) \cup (-2, \infty)$

Identifying the DOMAIN & RANGE given the graph of a function

Two common methods of determining the domain and range are algebraically (by hand) and graphically.

Identify the DOMAIN & RANGE of each of the following functions (use BOTH inequality and interval notation):

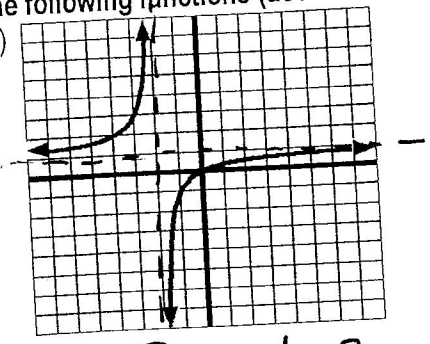
a) 

Domain Inequality: $\mathbb{R}$

Domain Interval: $(-\infty, \infty)$

Range Inequality: $y \geq -2$

Range Interval: $[-2, \infty)$

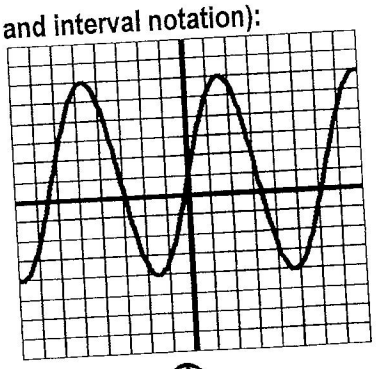
b) 

Domain Inequality: $\mathbb{R}, x \neq -2$

Domain Interval: $(-\infty, -2) \cup (-2, \infty)$

Range Inequality: $\mathbb{R}, y \neq 1$

Range Interval: $(-\infty, 1) \cup (1, \infty)$

c) 

Domain Inequality: $\mathbb{R}$

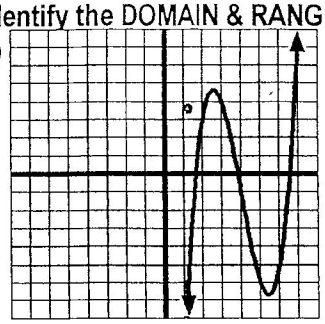
Domain Interval: $(-\infty, \infty)$

Range Inequality: $-4 \leq y \leq 6$

Range Interval: $[-4, 6]$

Identify the DOMAIN & RANGE of each of the following functions (use interval notation):

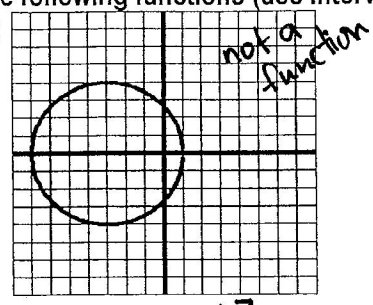
d)



Domain: $(-\infty, \infty)$

Range: $(-\infty, \infty)$

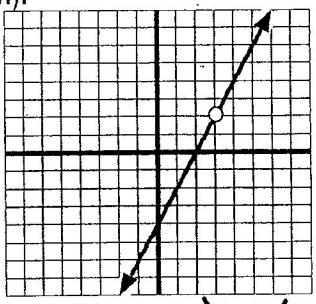
e)



Domain: $[-7, 1]$

Range: $[-4, 4]$

f)

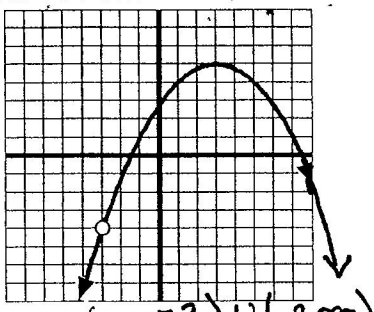


Domain: $(-\infty, 3) \cup (3, \infty)$

Range: $(-\infty, 2) \cup (2, \infty)$

NOW YOU TRY

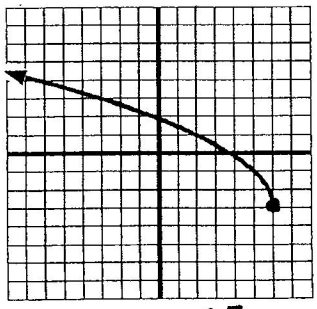
g)



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

Range: $(-\infty, 5]$

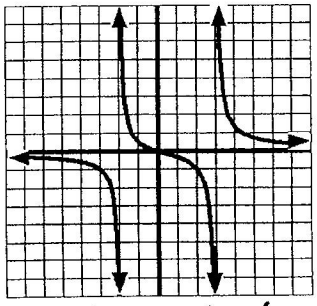
h)



Domain: $(-\infty, 6]$

Range: $[-3, \infty)$

i)



Domain: $(-\infty, -2) \cup (-2, 3) \cup (3, \infty)$

Range: $(-\infty, \infty)$

Identifying the DOMAIN given only the equation of a function

Rules for Domain (x-values):

- _____
- _____

Sample: $f(x) = |x - 5| + 2$ Domain: $(-\infty, \infty)$ Range: $[2, \infty)$

Examples: Find the domain.

1. $f(x) = \sqrt{x + 4}$

2. $g(x) = \frac{2}{x-5}$

Helpful hint→ Ask yourself ... "What numbers are acceptable to substitute in the function for x?"

For the following functions, determine the domain algebraically using the rules and then look at the graph to confirm. Are there errors in the y-column in the table? (ONLY use interval notation):

a) $f(x) = \sqrt{x+3}$

Domain: _____

b) $g(x) = \frac{3}{5x-4}$

Domain: _____

c) $h(x) = \frac{\sqrt{x}}{x-5}$

Domain: _____