

DO NOW

What is meant by domain and range?

domain $\rightarrow$ x-values
input
independent variable

range $\rightarrow$ y-values
output
dependent variable

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3.5 Functions - Day 2

* SEE CW 3.5-Functions-Day 2

1. Given the function $f(x) = 3x - 5$ with a domain of $\{0, 1, 2, 3\}$, identify the range? $\uparrow$ x-values

$$\begin{array}{ll} f(0) = 3(0) - 5 & f(2) = 3(2) - 5 \\ f(0) = 0 - 5 & f(2) = 6 - 5 \\ f(0) = -5 & f(2) = 1 \end{array}$$

$$\begin{array}{ll} f(1) = 3(1) - 5 & f(3) = 3(3) - 5 \\ f(1) = 3 - 5 & f(3) = 9 - 5 \\ f(1) = -2 & f(3) = 4 \end{array}$$

$$\{-5, -2, 1, 4\}$$

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2. If $x \geq 0$ is the domain for the function: $f(x) = -\frac{1}{2}x + 5$, what is the range?

* look for a pattern

$$\begin{array}{l} f(0) = -\frac{1}{2}(0) + 5 \\ f(0) = 0 + 5 \\ f(0) = 5 \end{array}$$

$$\begin{array}{l} f(2) = -\frac{1}{2}(2) + 5 \\ f(2) = -1 + 5 \\ f(2) = 4 \end{array}$$

$$\begin{array}{l} f(4) = -\frac{1}{2}(4) + 5 \\ f(4) = -2 + 5 \\ f(4) = 3 \end{array}$$

Is there a pattern to output?
Guess: $f(6) = 2$
 $f(8) = 1$
* 5 was the highest output

$$\text{range: } f(x) \leq 5$$

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3. If $x \leq -1$ is the domain for the function: $f(x) = x^2 + 3$, what is the range?

$$\begin{array}{l} f(-1) = (-1)^2 + 3 \\ f(-1) = 1 + 3 = 4 \end{array}$$

* lowest output is 4

$$\begin{array}{l} f(-2) = (-2)^2 + 3 \\ f(-2) = 4 + 3 \\ f(-2) = 7 \end{array}$$

$$\begin{array}{l} f(-3) = (-3)^2 + 3 \\ f(-3) = 9 + 3 \\ f(-3) = 12 \end{array}$$

* outputs are going up

$$\text{range: } f(x) \geq 4$$

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Domain restrictions:

- * Sometimes there is no restriction to the domain
 $\rightarrow$ x can be ALL REAL NUMBERS
- * Real world examples may exclude numbers from the domain
For example: If x represents the # of people
 $\rightarrow$ x cannot be negative, fractions or decimals
- * Desired values for the range
For example: If y is the number of people
 $\rightarrow$ only input values that result in whole #'s
- * Denominator CANNOT equal zero
* Remember $\frac{0}{0}$ is undefined
- * No negatives in square roots

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Identify the domain and range for each of the following.

4. $f(x) = 2x + 3$

domain: all real numbers

range: all real numbers

(look for fractions! $\sqrt{\quad}$)
(linear function)

5. $f(x) = x^2 - 1$

domain: all real numbers

range: $f(x) \geq -1$

$x^2 \rightarrow$ is always 0 or higher
 $x^2 - 1 \rightarrow$ is always -1 or higher

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Identify the domain and range for each of the following.

6. $f(x) = (x-1)^2 + 2$

domain: all real numbers

range: $f(x) \geq 2$

$(x-1)^2$ is 0 or higher
 $(x-1)^2 + 2$ is 2 or higher

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

domain: $x \geq -3$

$x+3$ cannot be negative $\rightarrow x+3 \geq 0$

range: $f(x) \geq 0$

$x+3$ is 0 or higher

$\sqrt{x+3}$ is 0 or higher

HOMEWORK

Worksheet - HW 3.5 Functions - Day 2