

Continuity 4: Domain and Range (Review)

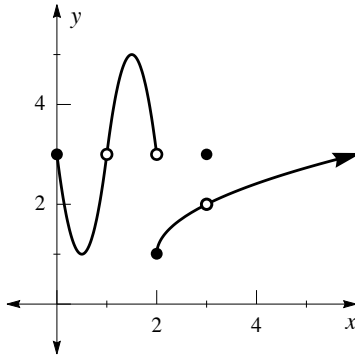
Domain

The domain of a function, $y = f(x)$, is all the x values that will give a real value for y .

Range

The range of a function, $y = f(x)$, is all the possible y values (the “spread” from the minimum y -value to the maximum y -value).

1. Examine the function below and describe, in your own words, its domain and range.



The domain is all the real numbers greater than or equal to zero, except $x = 1$.
The range is all the real numbers greater than or equal to 1.

2. [Challenge] Write the domain and range of the function in *Interval Notation*.

$$D = [0, 1) \cup (1, \infty)$$

$$R = [1, \infty)$$

3. [Challenge] Write the domain and range of the function in *Set Notation*.

$$D = \{x : x \geq 0 \text{ and } x \neq 1\}$$

$$R = \{y : y \geq 1\}$$

4. Consider three functions:

i. $f(x) = \sqrt{x - 25}$

ii. $g(x) = \frac{1}{x - 25}$

iii. $h(x) = \log(x - 25)$

- a. Using Desmos, describe the domains of the three functions. [Challenge] Use interval and set notation.

- i. All real numbers greater than or equal to 25.

$$D = [25, \infty) = \{x : x \geq 25\}$$

- ii. All real numbers except 25

$$D = (-\infty, 25) \cup (25, \infty) = \{x : x \neq 25\}$$

- iii. All real numbers strictly greater than 25

$$D = (25, \infty) = \{x : x > 25\}$$

- b. In words, explain what aspect of each function limits the domain of the function:

- i. $f(x) = \sqrt{x - 25}$ (a square root function)

Cannot take the square root of a negative number.

- ii. $g(x) = \frac{1}{x - 25}$ (a rational function)

Cannot divide by zero.

- iii. $h(x) = \log(x - 25)$ (a logarithmic function)

Cannot take the logarithm of a number less than or equal to zero.