

Function Notation

Warm Up

Determine the domain and range of the following:

$$y = 3|x - 6| - 2$$

$$D = \{x \in \mathbb{R}\}$$

$$R = \{y \in \mathbb{R} \mid y \geq -2\}$$

$$y = \frac{3}{x} - 2$$

$$D = \{x \in \mathbb{R} \mid x \neq 0\}$$

$$R = \{y \in \mathbb{R} \mid y \neq -2\}$$

$$y = -3\sqrt{x+2} - 1$$

$$D = \{x \in \mathbb{R} \mid x \geq -2\}$$

$$R = \{y \in \mathbb{R} \mid y \leq -1\}$$

$$(x-2)^2 + (y+1)^2 = 5^2$$

$$D = \{x \in \mathbb{R} \mid -3 \leq x \leq 7\}$$

$$R = \{y \in \mathbb{R} \mid -6 \leq y \leq 4\}$$

Function Notation

Function Notation is a notation, such as $f(x)$ [read as "f at x" or "f of x"], used to represent the value of the dependent variables for a given value of the independent variable.



Function Notation

Instead of seeing a function written like

$$y = \sqrt{x + 3} + 2$$

we will see

$$f(x) = \sqrt{x + 3} + 2$$

which just means that it is a function with an independent variable x .



Function Notation

This notation will make it easier when we need to evaluate for a given value of x . Instead of writing it out like in the warm up we can simply write:

Evaluate $f(-2)$ where $f(x) = \sqrt{x+3} + 2$

So since we substituted -2 in for x in $f(x)$ that tells us to do the same in the equation so we get:

$$\begin{aligned} &= \sqrt{(-2)+3} + 2 \\ &= \sqrt{1} + 2 \\ &= 1 + 2 \\ &= 3 \end{aligned}$$



Example

Evaluate the following for $f(x) = 2 - 3x$

| | | |
|--------------|---------------|-----------------------------------|
| $f(2)$ | $f(-4)$ | $f\left(\frac{1}{2}\right)$ |
| $= 2 - 3(2)$ | $= 2 - 3(-4)$ | $= 2 - 3\left(\frac{1}{2}\right)$ |
| $= 2 - 6$ | $= 2 - (-12)$ | $= 2 - 1\frac{1}{2}$ |
| $= -4$ | $= 14$ | $= \frac{1}{2}$ |

| | | |
|--------------|---------------|-----------------|
| $f(a)$ | $f(2x)$ | $2f(1)$ |
| $= 2 - 3(a)$ | $= 2 - 3(2x)$ | $= 2[2 - 3(1)]$ |
| $= 2 - 3a$ | $= 2 - 6x$ | $= 2[2 - 3]$ |
| | | $= 2[-1] = -2$ |

ExampleEvaluate the following for $h(t) = t^2 - 6t + 9$

$$\begin{array}{lll}
 h(3) & h(5) & h(5-3) = h(2) \\
 = (3)^2 - 6(3) + 9 & = (5)^2 - 6(5) + 9 & = (2)^2 - 6(2) + 9 \\
 = 9 - 18 + 9 & = 25 - 30 + 9 & = 4 - 12 + 9 \\
 = 0 & = 4 & = 1
 \end{array}$$

$$\begin{array}{ll}
 h(5) - h(3) & 3h(5) \\
 = 4 - 0 & = 3(4) \\
 = 4 & = 12
 \end{array}$$

Homework

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grey
 purple
 green
 yellow
 pink
 orange
 red
 blue
 BLACK

