

Functions as machines; domain, range, graphs

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Practice problems

1. Given the function $f(x) = x^2 + 3x - 5$, find the value of $f(-4)$.
2. Consider the function $g(x) = \frac{10}{x-3}$. What is the domain of this function?
3. A function $h(x)$ is graphed as a straight line segment starting at $(-1, 2)$ and ending at $(5, 10)$. State the domain and range in interval notation.

Solutions

1. Given the function $f(x) = x^2 + 3x - 5$, find the value of $f(-4)$.
 - Substitute -4 for every x in the expression: $f(-4) = (-4)^2 + 3(-4) - 5$.
 - Calculate the square: $(-4)^2 = 16$.
 - Calculate the multiplication: $3(-4) = -12$.
 - Combine the terms: $16 - 12 - 5 = 4 - 5 = -1$.

Answer: -1

2. Consider the function $g(x) = \frac{10}{x-3}$. What is the domain of this function?
 - Identify the operation that could be undefined: division by zero.
 - Set the denominator equal to zero to find the restricted value: $x - 3 = 0$.
 - Solve for x : $x = 3$.
 - The function is defined for all real numbers except $x = 3$.

Answer: $x \neq 3$

3. A function $h(x)$ is graphed as a straight line segment starting at $(-1, 2)$ and ending at $(5, 10)$. State the domain and range in interval notation.
 - Find the domain by looking at the x-coordinates of the endpoints: the leftmost is -1 and the rightmost is 5 .
 - The domain is $[-1, 5]$.
 - Find the range by looking at the y-coordinates of the endpoints: the lowest is 2 and the highest is 10 .
 - The range is $[2, 10]$.

Answer: Domain: $[-1, 5]$, Range: $[2, 10]$