Topic 1.1: Functions and Domain/Range - Day 2

Finding the Domain of a Function

The domain of a function *f* is the largest set of real numbers for which the value of *f(x)* is a real number.

Lets consider

$$f(x) = \frac{1}{x - 3}.$$

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We know that division by zero is undefined, thus the denominator "*x* - 3" cannot equal 0. Thus *x* cannot equal exactly 3. The domain consists of all real numbers other than 3. We write the domain like so...

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

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Now, lets consider

$$g(x) = \sqrt{x - 3}.$$

We know that only non-negative numbers have square roots that are real numbers, so, the expression under the square root sign, "*x* - 3", must be non-negative. We can set the part under the square root sign greater than or equal to zero ($x - 3 \geq 0$), and solve for *x*. We find that the domain is all real numbers greater than or equal to 3. Write like so...

$x - 3 \geq 0$

$x \geq 3$

$\boxed{D: [3, \infty)}$

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Ex1. Find the **domain** of each function.

a. $h(x) = \dfrac{1}{x^2 - 8x - 20}$

Factor.

$x^2 - 8x - 20 \neq 0$

$(x-10)(x+2) \neq 0$

$x \neq 10 \quad x \neq -2$

$\boxed{D: (-\infty, -2) \cup (-2, 10) \cup (10, \infty)}$

b. $f(x) = x^2 - 7x + 13$

no restrictions!

$\boxed{D: (-\infty, \infty)}$

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Ex1. Find the **domain** of each function.

c. $g(x) = \sqrt{3x + 12}$

Solve.

$3x + 12 \geq 0$

$3x \geq -12$

$x \geq -4$

$\boxed{D: [-4, \infty)}$

d. $j(x) = \dfrac{3}{\sqrt{x - 5}}$

Solve.

$x - 5 > 0$

$x > 5$

$\boxed{D: (5, \infty)}$

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