Finding the Domain of Radical Functions*

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Abstract

Finding the domain of radical/root functions.

When finding the domain of even-degree roots, the expression under the radical must be greater than or equal to 0.

Example 1
Find the domain of $y = \sqrt{x}$
$\{x \mid x \geq 0\}$

PRACTICE - Find the Domain of the following:

Exercise 1 *(Solution on p. 3.)*
$y = \sqrt{2x - 5}$

Exercise 2 *(Solution on p. 3.)*
$y = \sqrt[4]{7 - x}$

The rest of the answers will be expressed in interval notation since that is a simpler way to express answers.

Exercise 3 *(Solution on p. 3.)*
$y = \sqrt[4]{4x^2 - 16}$

Exercise 4 *(Solution on p. 3.)*
$y = \sqrt{16 - 25x^2}$

Exercise 5 *(Solution on p. 3.)*
$y = \sqrt{(x - 7)(x + 1)}$

Exercise 6 *(Solution on p. 3.)*
$y = \sqrt{2x^2 - 7x + 3}$

Exercise 7 *(Solution on p. 3.)*
$y = x\left(\sqrt{x^2 + 4}\right)$

Exercise 8 *(Solution on p. 3.)*
$y = x + \sqrt{-x + 8}$

*Version 1.3: Apr 27, 2006 3:34 pm -0500
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Exercise 9 *(Solution on p. 3.)*

$y = \sqrt{6x^2 + 8}$

Exercise 10 *(Solution on p. 3.)*

$y = \sqrt{(-8) - 6x^2}$

Solutions to Exercises in this Module

Solution to Exercise (p. 1)
$\left\{ x \mid x \geq \frac{5}{2} \right\}$ since $2x - 5 \geq 0$, $2x \geq 5$, $x \geq \frac{5}{2}$
Solution to Exercise (p. 1)
$\{ x \mid x \leq 7 \}$ since $7 - x \geq 0$, $-x \geq -7$, $x \leq 7$
Solution to Exercise (p. 1)
$(-\infty, -2] \cup [2, \infty)$ since $4x^2 - 16 \geq 0$, $4x^2 \geq 16$, $x^2 \geq 4$, $(x \leq -2) \ \vee \ (x \geq 2)$
Solution to Exercise (p. 1)
$\left[\frac{-4}{5}, \frac{4}{5} \right]$ since $16 - 25x^2 \geq 0$, $-25x^2 \geq -16$, $x^2 \leq \frac{16}{25}$, $\left(x \geq \frac{-4}{5} \right) \ \wedge \ \left(x \leq \frac{4}{5} \right)$
Solution to Exercise (p. 1)
$(-\infty, -1] \cup [7, \infty)$, $\sqrt{(x-7)(x+1)} \geq 0$
Solution to Exercise (p. 1)
$(-\infty, 1/2] \cup [3, \infty)$, $2x^2 - 7x + 3 \geq 0$, $(2x-1)(x-3) \geq 0$, $\left(x \leq \frac{1}{2} \right) \ \vee \ (x \geq 3)$
Solution to Exercise (p. 1)
$(-\infty, \infty)$, since $x^2 + 4 \geq 0$, $x^2 \geq -4$ This will always be true, for all real numbers, any number squared is always positive
Solution to Exercise (p. 1)
$(-\infty, 8]$ since $-x + 8 \geq 0$, $-x \geq -8$, $x \leq 8$
Solution to Exercise (p. 1)
$(-\infty, \infty)$, since $6x^2 + 8 \geq 0$, $6x^2 \geq -8$, $x^2 \geq \frac{-8}{6}$ This will always be true, for all real numbers, any number squared is always positive
Solution to Exercise (p. 2)
No solution since $(-8) - 6x^2 \geq 0$, $-6x^2 \geq 8$, $x^2 \geq \frac{-8}{6}$ This will never be true, so there is no solution, since any number squared is always positive, so it will never be less than 0.