

Chapter 2

Domain Knowledge

2.1 Simple Rational Functions¹

For fractions, the denominator (the bottom) of the fraction cannot equal 0. Determine **domain** restrictions by setting the denominator equal to 0 and solving.

Example 2.1

Find the domain of $y = \frac{1}{x}$
 $\{x \mid x \neq 0\}$

Exercise 2.1

Find the domain of $y = \frac{1}{x-5}$

(Solution on p. 24.)

Exercise 2.2

Find the domain of $y = \frac{4x+3}{x-7}$

(Solution on p. 24.)

Exercise 2.3

Find the domain of $y = \frac{7x}{5-2x}$

(Solution on p. 24.)

Exercise 2.4

Find the domain of $y = \frac{2}{(x-3)(x+7)}$

(Solution on p. 24.)

Exercise 2.5

Find the domain of $y = \frac{7x}{2x^2-7x+3}$

(Solution on p. 24.)

Exercise 2.6

$y = \frac{2x+1}{(x+5)^2}$

(Solution on p. 24.)

Exercise 2.7

Find the domain of $y = \frac{x+3}{x^2+25}$

(Solution on p. 24.)

Exercise 2.8

Find the domain of $y = \frac{x-7}{x^2+2}$

(Solution on p. 24.)

Exercise 2.9

Find the domain of $y = \frac{5}{|x-3|}$

(Solution on p. 24.)

Exercise 2.10

Find the domain of $y = \frac{4}{|x|-4}$

(Solution on p. 24.)

¹This content is available online at <http://cnx.org/content/m13352/1.7/>.

2.2 Radical Functions²

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

Example 2.2

Find the domain of $y = \sqrt{x}$

$$\{x \mid x \geq 0\}$$

PRACTICE - Find the Domain of the following:

Exercise 2.11

$$y = \sqrt{2x - 5}$$

(Solution on p. 24.)

Exercise 2.12

$$y = \sqrt[4]{7 - x}$$

(Solution on p. 24.)

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

Exercise 2.13

$$y = \sqrt[4]{4x^2 - 16}$$

(Solution on p. 24.)

Exercise 2.14

$$y = \sqrt{16 - 25x^2}$$

(Solution on p. 24.)

Exercise 2.15

$$y = \sqrt{(x - 7)(x + 1)}$$

(Solution on p. 24.)

Exercise 2.16

$$y = \sqrt{2x^2 - 7x + 3}$$

(Solution on p. 24.)

Exercise 2.17

$$y = x(\sqrt{x^2 + 4})$$

(Solution on p. 24.)

Exercise 2.18

$$y = x + \sqrt{-x + 8}$$

(Solution on p. 24.)

Exercise 2.19

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

(Solution on p. 24.)

Exercise 2.20

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

(Solution on p. 25.)

2.3 Algebraic Functions³

When finding domain consider the following:

- In rational functions, the denominator cannot equal 0
- When even-degreed roots are in the numerator, the expression under the radical must be greater than or equal to 0
- When even-degreed roots are in the denominator, the expression under the radical must be greater than 0

²This content is available online at <<http://cnx.org/content/m13583/1.3/>>.

³This content is available online at <<http://cnx.org/content/m13607/1.3/>>.

Exercise 2.21

$$y = \sqrt{12 - x}$$

*(Solution on p. 25.)***Exercise 2.22**

$$y = x^2 + 9x - 20$$

*(Solution on p. 25.)***Exercise 2.23**

$$y = \sqrt{x^2 + 6x + 5}$$

*(Solution on p. 25.)***Exercise 2.24**

$$y = \frac{x-2}{\sqrt{x+4}}$$

*(Solution on p. 25.)***Exercise 2.25**

$$y = \frac{\sqrt{7-x}}{x}$$

*(Solution on p. 25.)***Exercise 2.26**

$$y = \frac{x-1}{\sqrt{x^2-4x}}$$

*(Solution on p. 25.)***Exercise 2.27**

$$y = \frac{\sqrt{x^2-1}}{x^2-4}$$

*(Solution on p. 25.)***Exercise 2.28**

$$y = \frac{3x-1}{\sqrt{x+5}}$$

*(Solution on p. 25.)***Exercise 2.29**

$$\frac{1}{|\sqrt{x+1}|}$$

(Solution on p. 25.)