



Unit 6:
Lesson 02

More on domain, intercepts, notation, function values

Domain:

There are three things that can occur in an equation that would exclude values from the domain.

- A value of x that causes a denominator to be zero.
- A value of x that causes the quantity under an even root to be negative.
- A value of x that causes the argument of a logarithm to be negative or zero.

In addition to the above functional requirements, practical requirements in word problems will often restrict the domain. For example,

- the weight of an airplane can't be negative,
- the number of dogs must be a positive integer,
- the sine of an angle must be between -1 and 1 , etc.

Intercepts:

- To determine x-intercepts, set $y = 0$ and solve for x .
- To determine y-intercepts, set $x = 0$ and solve for y .

In the following examples, determine the domain and the intercepts:

Example 1: $y = 5x + 2$

Domain - Reals

$$x: \text{int} (y=0)$$

$$0 = 5x + 2$$

$$x = -2/5$$

$$y: \text{int} (x=0)$$

$$y = 5(0) + 2$$

$$y = 2$$

Example 2: $y = 4x/(x - 3) = \frac{4x}{x-3}$

Domain $x \neq 3$

$x: \text{int}$

$$0 = \frac{4x}{x-3}$$

$$x = 0$$

$y: \text{int}$

$$y = \frac{4(0)}{0-3}$$

$$y = 0$$

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

Domain $x+2 \geq 0$
 $x \geq -2$

x int

$$0^2 = \sqrt{x+2}^2$$

$$0 = x+2$$

$$\boxed{-2 = x}$$

y int

$$y = \sqrt{0+2}$$

$$\boxed{y = \sqrt{2}}$$

Example 4: $y = \log_b(x-7)$

Domain

$$x-7 > 0$$

$$x > 7$$

Notation:

The notation $f(-2)$ means to evaluate the function f at -2 (substitute in -2).

Example 5: If $f(x) = x^2 - 3x$, what is $f(-2)$?

$$\begin{aligned} f(-2) &= (-2)^2 - 3(-2) \\ &= 4 + 6 \\ &= \boxed{10} \end{aligned}$$

Example 6: If $f(x) = (x+3)/x$, name the ordered pair given by $f(4)$.

$$\begin{aligned} f(4) &= \frac{4+3}{4} = \frac{7}{4} \\ &\left(4, \frac{7}{4} \right) \end{aligned}$$

Example 7: Where does $f(x) = x + 7$ cross the x-axis?

Find x -int ($y=0$)

$$0 = x + 7$$

$$x = -7$$

Example 8: If $f(x) = (x - 3)/(x + 4)$ where does $f(x) = 5$?

$$5 = \frac{x-3}{x+4}$$

$$5x + 20 = x - 3$$

$$4x + 20 = -3$$

$$4x = -23$$

$$x = \frac{-23}{4}$$

Homework: Complete problems
1-12 on worksheet