

1.1 b - Functions & Domain

function notation

$f(x)$ \Rightarrow the value of the
"f of x" function "f" at x

$$y = f(x)$$

Equation

$$y = -6x + 3$$

Function Not.

$$f(x) = -6x + 3$$

Example $g(x) = x^2 + 8x - 24$

$g(6)$ replace all x's with 6

$$\begin{aligned} & 6^2 + 8(6) - 24 \\ & 36 + 48 - 24 = 60 \end{aligned}$$

$g(5c+4)$ replace x's with $(5c+4)$

$$\begin{aligned} & (5c+4)^2 + 8(5c+4) - 24 \\ & (5c+4)(5c+4) + 8(5c+4) - 24 \end{aligned}$$

$$25c^2 + 40c + 16 + 40c + 32 - 24$$

$$25c^2 + 80c + 24$$

Example 5 Find Domain Algebraically

Implied Domain \rightarrow all the Real inputs that produce a Real output

2 main instances of non-Real outputs

- * division by zero
(denominator = zero)
- * negative square roots
($x \geq 0$)

find the Domain

$$* f(x) = \frac{2+x}{x^2-7x}$$

set denominator equal to zero

$$x^2 - 7x = 0$$
$$x(x-7) = 0 \quad x=0, x=7$$

Domain is all real numbers
 $x \neq 0, x \neq 7$

$$* f(x) = \sqrt{t-5}$$

$t-5$ must be positive

$$t-5 \geq 0$$
$$\begin{array}{r} +5 \\ +5 \end{array}$$
$$\underline{t \geq 5}$$

Example 6 Piecewise functions

a piecewise function uses different equations on different intervals.

$$h(x) = \begin{cases} 1.6x - 41.6 & \text{if } 63 < x < 66 \\ 3x - 132 & \text{if } 66 \leq x \leq 68 \\ 2x - 66 & \text{if } x > 68 \end{cases}$$

find $h(67)$ (find the correct interval)

use $3x - 132$
 $3(67) - 132$
 $201 - 132 = 69''$

find $h(72)$

use $2x - 66$
 $2(72) - 66$
 $144 - 66 = 78''$