Chapter 1.1 - Summary
Functions

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September 9, 2024

1. What is a function?

   A functions is a relation where each input$x$ has a single unique output(y. A function must pass the vertical line test.

2. State the domain and range of each relation given. Identify if they are functions or not and explain your answer.

   a)
   $D : \{1, 2, 4\}$
   $R : \{1, 3, 6\}$
   Is a function

   b)
   $D : \{2, 4\}$
   $R : \{-1, -2, 5\}$
   Is not a function

   c)
   $D : \{x \in \mathbb{R}\}$
   $R : \{y \in \mathbb{R} | y \leq 5\}$
   Is a function

   d)
   $D : \{x \in \mathbb{R} | x \neq 3\}$
   $R : \{y \in \mathbb{R} | y \neq 0\}$
   Is a function

   e)
   $D : \{1, 4\}$
   $R : \{-1, -3, -5, -7\}$
   Is not a function

   f)
   $D : \{x \in \mathbb{R} | -3 \leq x \leq 7\}$
   $R : \{y \in \mathbb{R} | -5 \leq x \leq 5\}$
   Is not a function

3. Write an equation to describe the following functions.

   a) The input is 5 less then the output

   $$f(x) = x + 5$$

   b) Add three to twice the input to find the output.

   $$f(x) = 2x + 3$$

   c) Paris wants to build a corner garden, she only needs two new sides. The total length must be 10 meters. She wants the length to be four times the width. Write an equation to represent the sum of the length and with, also find the desired dimensions.

   $$f(l) = l + w$$

   $$\begin{array}{ll} 4w = l & 10 = l + \frac{l}{4} \\ w = \frac{l}{4} & 40 = 4l + l \\ & 40 = 5l \\ & 8 = l \end{array} \qquad \begin{array}{l} f(l) = l + w \\ 10 = 8 + w \\ 2 = w \end{array}$$

   The desired dimensions are 8 meters for the length and 2 meters for the width.

4. For the function $f(x) = 3x + 9$

   a) Find $f(4)$

   $$\begin{aligned} f(4) &= 3(4) + 9 \\ &= 12 + 9 \\ &= 21 \end{aligned}$$

   b) Find $f(7) - f(3)$

   $$\begin{aligned} f(7) - f(3) &= (3(7) + 9) - (3(3) + 9) \\ &= 30 - 18 \\ &= 12 \end{aligned}$$