

## Reading Questions 6

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1. A function is a set.
2. Let  $f$  be a function from the set  $A$  to the set  $B$ . Then the range of  $f$  is  $B$ .
3. All functions are one-to-one.
4. What does it mean for a function to be a one-to-one?

### Section 3.1 Basic Terminology (Part 1)

#### Functions as Sets

- P 1.** Write a binary relation from the set  $\{1, 2, 3\}$  to the set  $\{1, 2, 3\}$ .
- P 2.** Is the set  $\{(1, 2), (3, 1), (2, 1)\}$  a function from the set  $\{1, 2, 3\}$  to the set  $\{1, 2, 3\}$ .
- P 3.** Let  $A = \{1, 2, 3\}$  and  $B = \{a, b, c, d\}$ . Give an example of a relation from  $A$  to  $B$  containing exactly three elements such that the relation is not a function from  $A$  to  $B$ .
- P 4.** Let  $A = \{a, b, c, d\}$  and  $B = \{x, y, z\}$ . Then  $f\{(a, y), (b, z), (c, y), (d, z)\}$  is a function from  $A$  to  $B$ . Determine  $\text{dom } f$  and  $\text{rng } f$ .
- P 5.** Let  $A = \{w, x, y, z\}$  and  $B = \{r, s, t\}$ . Give an example of a function  $f : A \rightarrow B$  that is neither one-to-one nor onto.

#### Functions as Sets Proofs

- P 6.** Show that the function  $f = \{(x_1, x_2) \mid x_1^2 = x_2\}$  from  $\mathbb{N}$  to  $\mathbb{N}$  is one-to-one. Is the function onto?
- P 7.** Let  $f = \{(x, y) \mid y = 3x + 5\}$  be the function from  $\mathbb{N}$  to  $\mathbb{N}$ . Show that  $f$  is a bijection.
- P 8.** Determine the values for  $\lfloor \frac{\pi}{-3} \rfloor$ ,  $\lfloor \pi \rfloor$ ,  $\lceil e \rceil$  and  $\lfloor \pi + e \rfloor$ .