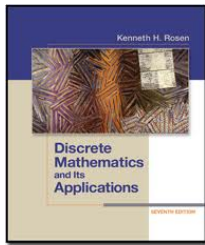
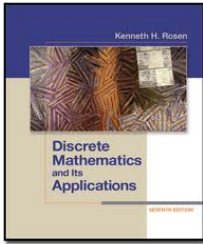


Peer Instruction #4: Sets and Functions



Which of the following is a valid set?

- A. $\{ 1, 3, 3, 5, 5, 5, 7, 7, 7, 7 \}$
- B. $\{ 1, 3, 5, a, c, c, e, \text{"hello"}, \text{"there"} \}$
- C. $\{ \{a, b, c\}, \{0, 1, 2\}, (d, e), (4, 5, 6), 12 \}$
- D. All of the above
- E. None of the above



What is the cardinality of the sets defined below (in the order shown)?

$$A = \{ a, 6, 17, b, 6, 12, b, (a, b) \}$$

$$B = \{ (1, a), (1, b), (1, c), (a, 1) \}$$

$$C = \{ 6, 23, \{4, 5, 6\}, 82, \{ \} \}$$

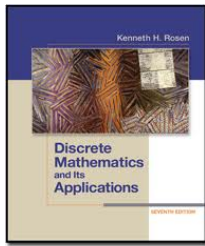
A. 6, 4, 5

B. 8, 4, 5

C. 6, 8, 6

D. 6, 4, 4

E. 8, 8, 7



What are the union, intersection, and difference of the following sets:?

$$A = \{ a, 4, b, c, 6 \}$$

$$B = \{ a, 6, 5, d, c \}$$

- A. $A \cup B = \{a, a, b, c, c, d, 4, 5, 6, 6\}$, $A \cap B = \{a, c, 6\}$, $A - B = \{d, 5\}$
- B. $A \cup B = \{a, b, c, d, 4, 5, 6\}$, $A \cap B = \{a, c, 6\}$, $B - A = \{4, b, d, 5\}$
- C. $A \cup B = \{a, 6, 4, b, 5, c, d\}$, $A \cap B = \{6, a, c\}$, $B - A = \{4, b\}$
- D. $A \cup B = \{a, c, 6\}$, $A \cap B = \{a, b, c, d, 4, 5, 6\}$, $A - B = \{4, b\}$
- E. $A \cup B = \{6, 5, 4, d, c, b, a\}$, $A \cap B = \{a, c, 6\}$, $B - A = \{d, 5\}$

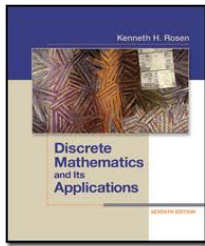


Figure out which axioms are true and which are false (in order given).

$$A \cup \{\} = \{\}$$

$$A - B = B - A$$

$$A \cup B = B \cup A$$

$$\overline{A} = U - A$$

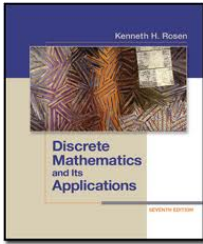
$$A. \quad T, F, T, T$$

$$B. \quad F, F, T, F$$

$$C. \quad F, T, T, F$$

$$D. \quad T, F, F, T$$

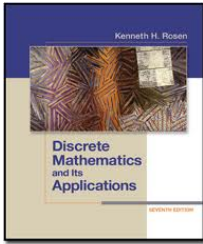
$$E. \quad F, F, T, T$$



What set is defined by the following set builder?

$$\{ x \in \mathbb{Z} \mid -6 \leq x^2 + 3x - 6 \leq 12 \}$$

- A. $\{ -6, -5, -4, -3, -2, -1, 0, 1, 2, 3 \}$
- B. $\{ -6, -5, -4, -3, 0, 1, 2, 3 \}$
- C. $\{ -6, -5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5, 6 \}$
- D. $\{ -6, -5, -4, -3, 0, 1, 2, 3, 4, 5, 6 \}$
- E. None of the above



What are the sizes of the Cartesian product of $A \times B$, and the power sets $P(A)$ and $P(B)$ for the following sets?

$$A = \{ a, b, c, d, a \}$$

$$B = \{ 0, 3, 5 \}$$

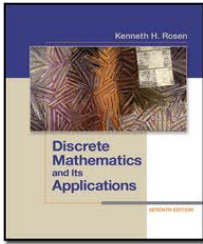
A. 12, 15, 15

B. 12, 16, 8

C. 125, 32, 8

D. 12, 16, 9

E. None of the above



Which of the following are functions
are 1 to 1 or 'injective'?

1. $f_{\text{quad}}(x) = x^2 + 3x - 2, x \in \mathbb{Z}^+, f(x) \in \mathbb{Z}$

2. $f_{\text{sqrt}}(x) = \text{Math.sqrt}(x), x \in \mathbb{Z}^+, f(x) \in \mathbb{Z}^+$

3. $f_{\text{floor}}(x) = \text{Math.floor}(x), x \in \mathbb{R}, f(x) \in \mathbb{Z}$

4. $f_{\text{pred}}(x) = x - 1, x \in \mathbb{Z}, f(x) \in \mathbb{Z}$

A. 1 and 4

B. 3 and 4

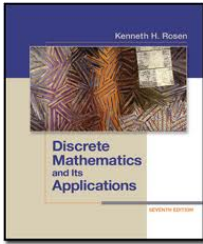
C. 1 and 2 and 4

D. All are injective

E. None are injective

F. Hard to say!

Injective Functions



Which of the following are functions
are increasing?

1. $f_{\text{quad}}(x) = x^2 + 3x - 2, x \in \mathbb{Z}, f(x) \in \mathbb{Z}$

2. $f_{\text{sqrt}}(x) = \text{Math.sqrt}(x), x \in \mathbb{Z}^+, f(x) \in \mathbb{Z}^+$

3. $f_{\text{floor}}(x) = \text{Math.floor}(x), x \in \mathbb{R}, f(x) \in \mathbb{Z}$

4. $f_{\text{pred}}(x) = x - 1, x \in \mathbb{Z}, f(x) \in \mathbb{Z}$

A. 1 and 4

B. 3 and 4

C. 2 and 3 and 4

D. All are increasing

E. None are increasing

F. Hard to say!

Increasing Functions