

Discrete Mathematics and its Applications - 2.1 Sets

1. List the members of these sets.

(member: 원소, set: 집합, real number: 실수, positive integer: 양의 정수, square: 제곱)

- a) $\{x \mid x \text{ is a real number such that } x^2 = 1\}$
- b) $\{x \mid x \text{ is a positive integer less than } 12\}$
- c) $\{x \mid x \text{ is the square of an integer and } x < 100\}$
- d) $\{x \mid x \text{ is an integer such that } x^2 = 2\}$

2. Use set builder notation to give a description of each of these sets. (set builder notation: 조건제시법)

- a) $\{0, 3, 6, 9, 12\}$
- b) $\{-3, -2, -1, 0, 1, 2, 3\}$
- c) $\{m, n, o, p\}$

3. Which of the intervals $(0, 5)$, $(0, 5]$, $[0, 5)$, $[0, 5]$, $(1, 4)$, $[2, 3]$, $(2, 3)$ contains (interval: 구간)

- a) 0? b) 1?
- c) 2? d) 3?
- e) 4? f) 5?

4. For each of these intervals, list all its elements or explain why it is empty.

(elements: 원소들)

- a) $[a, a]$ b) $[a, a)$
- c) $(a, a]$ d) (a, a)
- e) (a, b) , where $a > b$ f) $[a, b]$, where $a > b$

7. Determine whether each of these pairs of sets are equal.

- a) $\{1, 3, 3, 3, 5, 5, 5, 5, 5\}$, $\{5, 3, 1\}$
- b) $\{\{1\}\}$, $\{1, \{1\}\}$ c) \emptyset , $\{\emptyset\}$

9. For each of the following sets, determine whether 2 is an element of that set.

- a) $\{x \in \mathbf{R} \mid x \text{ is an integer greater than } 1\}$
- b) $\{x \in \mathbf{R} \mid x \text{ is the square of an integer}\}$
- c) $\{2, \{2\}\}$ d) $\{\{2\}, \{\{2\}\}\}$
- e) $\{\{2\}, \{2, \{2\}\}\}$ f) $\{\{\{2\}\}\}$

10. For each of the sets in Exercise 9, determine whether $\{2\}$ is an element of that set.

21. What is the cardinality of each of these sets?

- a) $\{a\}$ b) $\{\{a\}\}$
- c) $\{a, \{a\}\}$ d) $\{a, \{a\}, \{a, \{a\}\}\}$

(cardinality: 원소의 개수)

22. What is the cardinality of each of these sets?

- a) \emptyset b) $\{\emptyset\}$
- c) $\{\emptyset, \{\emptyset\}\}$ d) $\{\emptyset, \{\emptyset\}, \{\emptyset, \{\emptyset\}\}\}$

Discrete Mathematics and its Applications - 2.2 Set Operations

3. Let $A = \{1, 2, 3, 4, 5\}$ and $B = \{0, 3, 6\}$. Find
- a) $A \cup B$.
 - b) $A \cap B$.
 - c) $A - B$.
 - d) $B - A$.
4. Let $A = \{a, b, c, d, e\}$ and $B = \{a, b, c, d, e, f, g, h\}$. Find
- a) $A \cup B$.
 - b) $A \cap B$.
 - c) $A - B$.
 - d) $B - A$.
14. Find the sets A and B if $A - B = \{1, 5, 7, 8\}$, $B - A = \{2, 10\}$, and $A \cap B = \{3, 6, 9\}$.
27. Let $A = \{0, 2, 4, 6, 8, 10\}$, $B = \{0, 1, 2, 3, 4, 5, 6\}$, and $C = \{4, 5, 6, 7, 8, 9, 10\}$. Find
- a) $A \cap B \cap C$.
 - b) $A \cup B \cup C$.
 - c) $(A \cup B) \cap C$.
 - d) $(A \cap B) \cup C$.

Discrete Mathematics and its Applications - 1.1 Propositional Logic

1. Which of these sentences are propositions? What are the truth values of those that are propositions?

(proposition: 명제, truth values: 참 거짓)

- a) Boston is the capital of Massachusetts.
- b) Miami is the capital of Florida.
- c) $2 + 3 = 5$.
- d) $5 + 7 = 10$.
- e) $x + 2 = 11$.
- f) Answer this question.

5. What is the negation of each of these propositions?

(negation: 부정)

- a) Mei has an MP3 player.
- b) There is no pollution in New Jersey.
- c) $2 + 1 = 3$.
- d) The summer in Maine is hot and sunny.

References

Kenneth Rosen, 「Discrete Mathematics and its Applications」, 8th Edition, Pearson (2018)

<https://quizlet.com/explanations/textbook-solutions/discrete-mathematics-and-its-applications-8th-edition-9781259676512>