

# CIT 5920 — Lecture 3: Sets Operations

10 - 10 Sep 2024

Poll results

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Survey (1/5)

0 1 9

**If  $S$  is a set containing numbers, which notation indicates that 4 is an element of  $S$ ?**

(1/2)

$S = 4$

☐ 0 %

$S \in 4$

☐ 0 %

$S > 4$

☐ 0 %

$S(4)$

☐ 0 %

$4 \in S$  ✓

 100 %

Survey (1/5)

0 1 9

**If  $S$  is a set containing numbers, which notation indicates that 4 is an element of  $S$ ?**

(2/2)

4(S)

☐ 0 %

Survey (2/5)

0 2 6

**Which of the following sets includes all the integers from 1 to 5 (both included)?**  
(1/2)

$\{1, 2, 3, 4, 5\}$  ✓



$\{k \in \mathbb{N} \mid 1 \leq k \leq 5\}$  ✓



$\{1, \dots, 5\}$  ✓



$\{1, 2, 3, \dots\}$  ✓



$\{5, 3, 2, 1, 4\}$  ✓



Survey (2/5)

0 2 6

**Which of the following sets includes all the integers from 1 to 5 (both included)?**  
(2/2)

$\{ 1, 3 \}$

☐ 0 %

Survey (3/5)

038

**Which of the following numbers is NOT a natural number?**

(1/2)

120

☐ 0 %

59

☐ 0 %

-2 ✓

☒ 97 %

0.5 ✓

☒ 95 %

$\sqrt{2}$  ✓

☒ 100 %

Survey (3/5)

038

**Which of the following numbers is NOT a natural number?**

(2/2)

1/3 ✓



3

0 %

Survey (4/5)

0 3 4

**Let  $\text{Odd} = \{ x \in \mathbb{N} \mid x \text{ is odd} \}$ . Pick all that apply.**  
(1/2)

$0 \in \text{Odd}$

 6 %

$-3 \in \text{Odd}$

 12 %

$5 \in \text{Odd}$  ✓

 94 %

$\{ 1, 3, 5 \} \subset \text{Odd}$  ✓

 94 %

$\text{Odd} \in 5$

 3 %

Survey (4/5)

0 3 4

**Let  $\text{Odd} = \{ x \in \mathbb{N} \mid x \text{ is odd} \}$ . Pick all that apply.**  
(2/2)

$\text{Odd} \subset \{ 1, 3, 5 \}$

☐ 3 %

$1 \in \text{Odd}$  ☒

☒ 97 %

Survey (5/5)

039

**Let  $T = \{ x \in \mathbb{N} \mid x \text{ is a multiple of } 3 \}$ . Pick all that apply.**  
(1/2)

T contains 3 elements

☐ 3 %

T contains an infinite number of elements ✓

☒ 100 %

T contains negative numbers

☐ 3 %

$3 \in T$  ✓

☒ 100 %

$9 \in T$  ✓

☒ 100 %

Survey (5/5)

039

**Let  $T = \{ x \in \mathbb{N} \mid x \text{ is a multiple of } 3 \}$ . Pick all that apply.**  
(2/2)

$13 \in T$

☐ 0 %

$0 \in T$  ✓

☒ 74 %

$T = \{0, 3, 6, 9, \dots\}$  ✓

☒ 90 %

**What elements does the set A contain?**  
(1/2)

{ 1, 5 }

☐ 0 %

{ 2, 10 }

☐ 0 %

{ 3, 7, 9 }

☐ 0 %

{ 1, 2, 5, 10 } ✓

☒ 100 %

{ 2, 10, 4, 8 6 }

☐ 0 %

Sets: Venn Diagrams (1/6)

0 4 6

**What elements does the set A contain?**  
(2/2)

{ 1, 5, 2, 10, 4, 8, 6 }

☐ 0 %

**What elements does the set B contain?**

$\{ 2, 10 \}$

☐ 0 %

$\{ 4, 8, 6 \}$

☐ 0 %

$\{ 2, 4, 6, 8, 10 \}$

☒ 100 %

$\{ 1, 5, 2, 10, 4, 8, 6 \}$

☐ 0 %

**What elements does the INTERSECTION of A and B contain ?**

$\{ 2, 10 \}$



$\{ 1, 5 \}$

☐ 0 %

$\{ 4, 8, 6 \}$

☐ 0 %

$\{ 1, 5, 2, 10, 4, 8, 6 \}$

☐ 0 %

**What elements does the set  $A \cup B$  contain?**

$\{ 1, 5 \}$

☐ 0 %

$\{ 2, 10 \}$

☐ 4 %

$\{ 4, 8, 6 \}$

☐ 0 %

$\{ 1, 5, 2, 10, 4, 8, 6 \}$

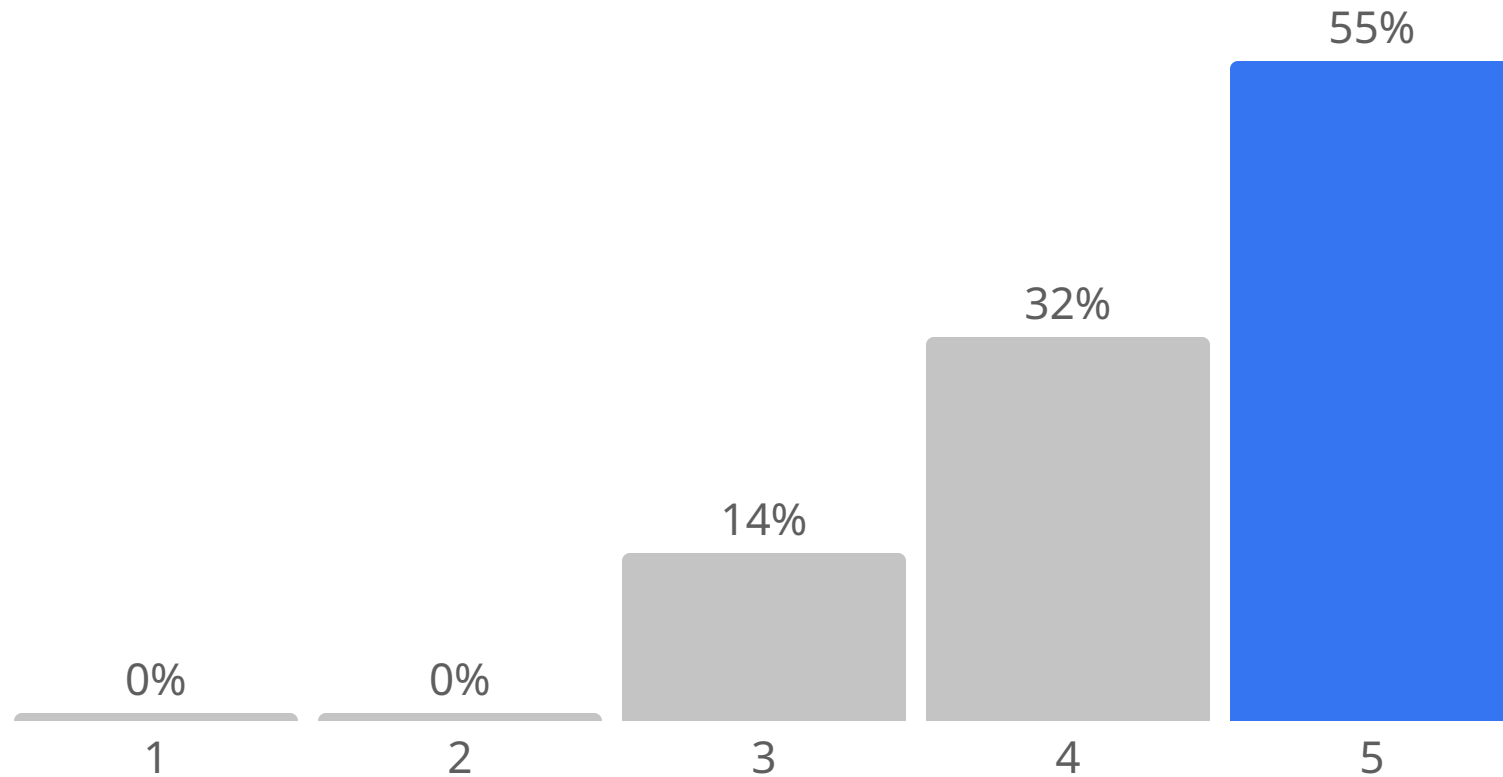
☒ 96 %

$\{ 2, 10, 4, 8, 6 \}$

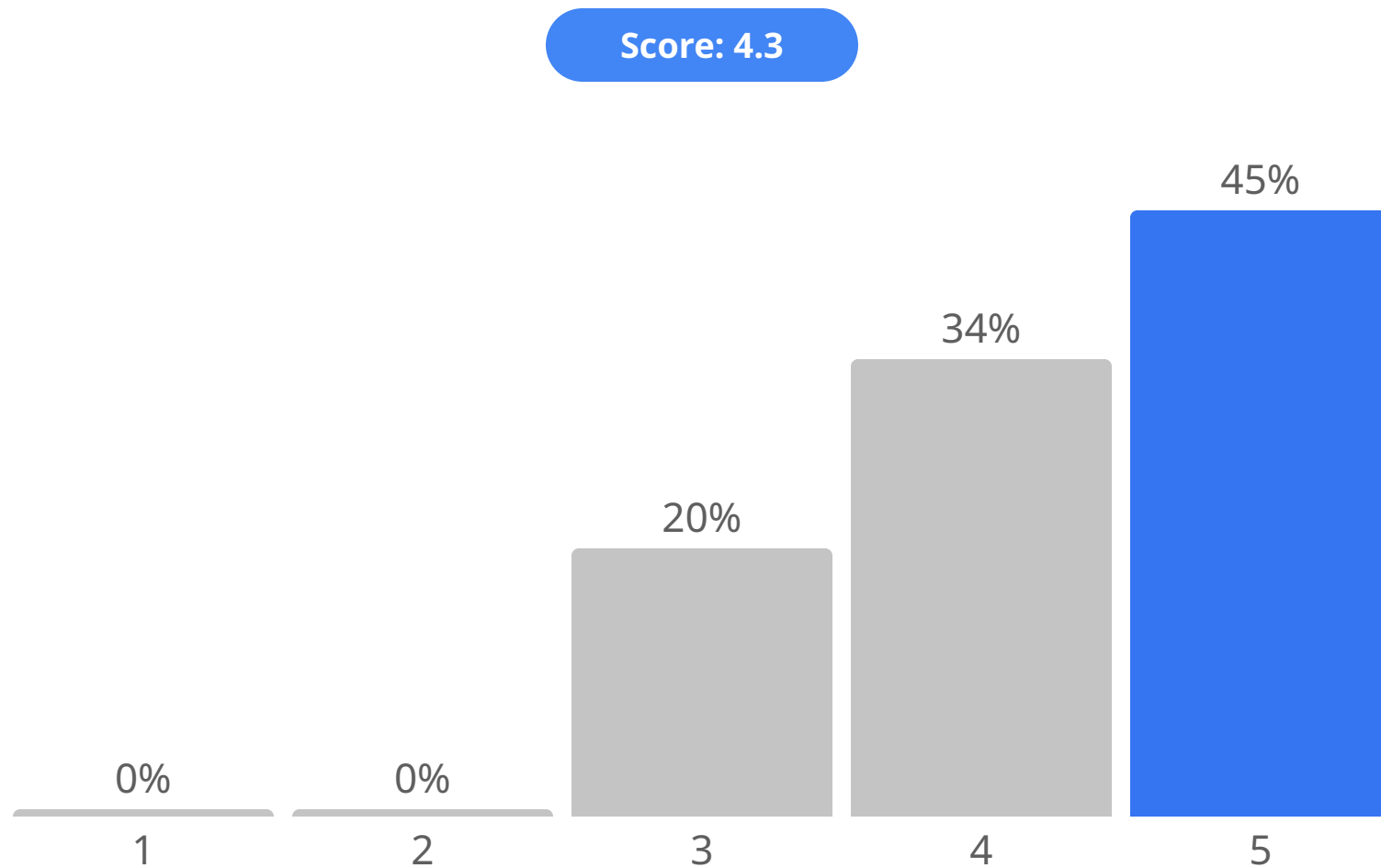
☐ 0 %

## How confident are you about Venn Diagrams?

Score: 4.4



## How confident are you about drawing the Venn Diagram of three sets?



Sets: Operations (1/7)

0 4 3

**What is the UNION of the sets  $\{1, 2, 3\}$  and  $\{3, 4, 5\}$ ?**

(1/2)

$\emptyset$

 2 %

$\{1, 2, 3, 4, 5, 6\}$

 7 %

$\{1, 2, 3, 4, 5\}$  ✓

 93 %

$\{3\}$

 7 %

$\{1, 2, 3\}$

 9 %

Sets: Operations (1/7)

0 4 3

**What is the UNION of the sets  $\{1, 2, 3\}$  and  $\{3, 4, 5\}$ ?**

(2/2)

$\{3, 4, 5\}$

 9 %

$\{\}$

 5 %

$\{1, 2, 3, 3, 4, 5\}$  ✓

 53 %

Sets: Operations (2/7)

0 4 3

**What is the INTERSECTION of the sets {1, 2, 3} and {3, 4, 5}?**  
(1/2)

$\emptyset$

☐ 0 %

{1, 2, 3, 4, 5, 6}

☐ 0 %

{1, 2, 3}

☐ 0 %

{3} ✓

☒ 100 %

{3, 4, 5}

☐ 0 %

Sets: Operations (2/7)

0 4 3

**What is the INTERSECTION of the sets {1, 2, 3} and {3, 4, 5}?**  
(2/2)

$\{\}$

☐ 0 %

$\{1, 2, 3, 3, 4, 5\}$

☐ 0 %

Sets: Operations (3/7)

0 4 3

**What is the intersection of the sets  $\{a, b, c\}$  and  $\{c, d, e\}$ ?**  
(1/2)

$\{\}$

☐ 0 %

$\{a\}$

☐ 0 %

$\{b\}$

☐ 0 %

$\{c\}$  ✓

☒ 100 %

$\{a, c\}$

☐ 0 %

Sets: Operations (3/7)

0 4 3

**What is the intersection of the sets  $\{a, b, c\}$  and  $\{c, d, e\}$ ?**  
(2/2)

$\{a, b\}$

☐ 0 %

$\{b, d\}$

☐ 0 %

$\{b, d, e\}$

☐ 0 %

Sets: Operations (4/7)

0 4 3

**Let  $\text{Odd} = \{ x \in \mathbb{N} \mid x \text{ is odd} \}$  and  $\text{Even} = \{ x \in \mathbb{N} \mid x \text{ is even} \}$ . What is  $\text{Odd} \cap \text{Even}$ ?**  
(1/2)

$\{\}$  ✓



$\emptyset$  ✓



$\mathbb{N}$

2 %

$\mathbb{Z}$

5 %

$\{0, 1, 2, 3, \dots\}$

5 %

Sets: Operations (4/7)

0 4 3

**Let  $\text{Odd} = \{ x \in \mathbb{N} \mid x \text{ is odd} \}$  and  $\text{Even} = \{ x \in \mathbb{N} \mid x \text{ is even} \}$ . What is  $\text{Odd} \cap \text{Even}$ ?**  
(2/2)

$\{0, 2, 4, 6, \dots\}$

☐ 0 %

Sets: Operations (5/7)

0 4 3

**Let  $\text{Odd} = \{ x \in \mathbb{N} \mid x \text{ is odd} \}$  and  $\text{Even} = \{ x \in \mathbb{N} \mid x \text{ is even} \}$ . What is  $\text{Odd} \cup \text{Even}$ ?**  
(1/2)

$\{\}$

☐ 0 %

$\emptyset$

☐ 2 %

$\mathbb{N}$  ✓

☒ 63 %

$\mathbb{Z}$

☐ 7 %

$\{0, 1, 2, 3, \dots\}$  ✓

☒ 26 %

Sets: Operations (5/7)

0 4 3

**Let  $\text{Odd} = \{ x \in \mathbb{N} \mid x \text{ is odd} \}$  and  $\text{Even} = \{ x \in \mathbb{N} \mid x \text{ is even} \}$ . What is  $\text{Odd} \cup \text{Even}$ ?**  
(2/2)

$\{0, 2, 4, 6, \dots\}$

☐ 2 %

Sets: Operations (6/7)

0 4 1

**Let  $\text{Odd} = \{ x \in \mathbb{N} \mid x \text{ is odd} \}$  and  $\text{Even} = \{ x \in \mathbb{N} \mid x \text{ is even} \}$ . What is  $\text{Even} \setminus \text{Odd}$ ?**  
(1/2)

$\{ \}$

 2 %

$\emptyset$

 20 %

$\mathbb{N}$

 15 %

$\mathbb{Z}$

 7 %

$\{0, 1, 2, 3, \dots\}$

 5 %

Sets: Operations (6/7)

0 4 1

**Let  $\text{Odd} = \{ x \in \mathbb{N} \mid x \text{ is odd} \}$  and  $\text{Even} = \{ x \in \mathbb{N} \mid x \text{ is even} \}$ . What is  $\text{Even} \setminus \text{Odd}$ ?**  
(2/2)

$\{0, 2, 4, 6, \dots\}$  ✓



Sets: Operations (7/7)

0 4 3

**Let  $\text{Odd} = \{ x \in \mathbb{N} \mid x \text{ is odd} \}$  and  $\text{Even} = \{ x \in \mathbb{N} \mid x \text{ is even} \}$ . What is the complement of Odd?**  
(1/2)

$\{ \}$

☐ 0 %

$\emptyset$

☐ 0 %

$\mathbb{N}$

☐ 2 %

$\mathbb{Z}$

☐ 2 %

$\{0, 1, 2, 3, \dots\}$

☒ 5 %

Sets: Operations (7/7)

0 4 3

**Let  $\text{Odd} = \{ x \in \mathbb{N} \mid x \text{ is odd} \}$  and  $\text{Even} = \{ x \in \mathbb{N} \mid x \text{ is even} \}$ . What is the complement of Odd?**  
(2/2)

$\{0, 2, 4, 6, \dots\}$  ✓



Quiz: Cardinality understanding question (1/1)

0 4 8

**Check to see if you understand cardinality:**  
(1/2)

$\{1\}$  has 1 element ✓



$\{1, 1, 1\}$  has 1 element ✓



$\{1, 2, 3, \dots\}$  has infinitely many elements ✓



$\{1, 1, 1\}$  has 3 elements



$\{1, 1, 1, \dots\}$  has infinitely many elements



Quiz: Cardinality understanding question (1/1)

0 4 8

**Check to see if you understand cardinality:**  
(2/2)

$\{1, 2, 3\}$  has infinitely many elements

☐ 0 %

$\{1, 2, 3\}$  has three elements ✓

☒ 96 %

$\{\}$  has 0 elements ✓

☒ 96 %

$\emptyset$  has 0 elements ✓

☒ 96 %

Sets: Powersets (1/4)

0 4 9

**Let  $S = \{1, 2\}$ , what is  $P(S)$ ?**  
(1/2)

$\{1, 2\}$

☐ 4 %

$\{\{1\}, \{2\}\}$

☐ 4 %

$\{\{1\}, \{2\}, \{1, 2\}\}$

☐ 2 %

$\{\{0\}, \{1\}, \{2\}, \{1, 2\}\}$

☐ 6 %

$\{\{\}, \{1\}, \{2\}, \{1, 2\}\}$  ✓

☒ 94 %

Sets: Powersets (1/4)

0 4 9

**Let  $S = \{1, 2\}$ , what is  $P(S)$ ?**  
(2/2)

$\{\}, \{1\}, \{2\}, \{1, 2\}, 1, 2$

☐ 0 %

$\{\}, 1, 2$

☐ 4 %

Sets: Powersets (2/4)

0 4 8

**Let  $S = \{1,2,3\}$ , what is the cardinality of  $P(S)$ ?**  
(1/2)

0

☐ 0 %

1

☐ 0 %

3

☒ 27 %

4

☐ 4 %

6

☐ 4 %

Sets: Powersets (2/4)

0 4 8

**Let  $S = \{1,2,3\}$ , what is the cardinality of  $P(S)$ ?**  
(2/2)

8 ✓



10

☐ 2 %

13

☐ 0 %

Sets: Powersets (3/4)

0 4 9

**Let  $S = \{1,2,3\}$ , which of the following statements are true?**

(1/2)

$|S| = 3$  ✓



$|P(S)| = 6$



$3 \in S$  ✓



$\{3\} \in S$



$3 \in P(S)$



Sets: Powersets (3/4)

0 4 9

**Let  $S = \{1,2,3\}$ , which of the following statements are true?**

(2/2)

$\{3\} \in P(S)$  ✓



$S \in S$



$S \in P(S)$  ✓



## What is your confidence level with powersets?

