

4.5

Difference of Sets

• Example 1

Using a definition by extension, specify the set A determined by the following equation.

$$A = \{n \in \mathbb{N} \mid -10 \leq 7 - 2n \leq -1\} \setminus \{1, 2, 3, 4, 5\}$$

\mathbb{N} is the set of natural numbers.

We begin by finding the natural numbers n that satisfy the inequality:

$$-10 \leq 7 - 2n \leq -1$$

$$-17 \leq -2n \leq -8$$

$$\frac{17}{2} \geq n \geq 4$$

We obtain the set $\{4, 5, 6, 7, 8\}$.

$$\begin{aligned} \text{Thus } A &= \{4, 5, 6, 7, 8\} \setminus \{1, 2, 3, 4, 5\} \\ &= \{6, 7, 8\}. \end{aligned}$$

• • • CHECK YOURSELF 1

Using a definition by extension, specify the set B determined by the following equation.

$$B = \{m \in \mathbb{N} \mid -21 \leq -3m + 9 < -3\} \setminus \{4, 5, 6, 7\}$$

• • • CHECK YOURSELF ANSWER

1. $B = \{8, 9, 10\}$.

4.5 Exercises

Name _____

Section _____

Date _____

A N S W E R S

1. _____

2. _____

3. _____

4. _____

5. _____

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7. _____

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9. _____

10. _____

Using a definition by extension, specify the set A determined by each of the following equations. \mathbb{N} represents the set of natural numbers and \mathbb{Z} represents the set of integers.

1. $A = \{m \in \mathbb{N} \mid 0 \leq m - 9 < 11\} \setminus \{3, 5, 7, 9, 11\}$

2. $A = \{n \in \mathbb{Z} \mid -12 < 3n + 4 \leq 5\} \setminus \{0, 1, 2, 3\}$

3. $A = \{n \in \mathbb{N} \mid -30 \leq -4n + 12 < -6\} \setminus \{-10, -5, 0, 5, 10\}$

4. $A = \{n \in \mathbb{Z} \mid -6 < 8 - 2n \leq 16\} \setminus \{m \in \mathbb{Z} \mid m \leq 0\}$

5. $A = \{n \in \mathbb{Z} \mid -10 \leq -n - 6 \leq -1\} \setminus \{m \in \mathbb{N}\}$

6. $A = \{n \in \mathbb{N} \mid 10 \leq 9n - 2 \leq 13\} \setminus \{-1, 0, 1\}$

7. $A = \{n \in \mathbb{Z} \mid n < 10\} \setminus \{m \in \mathbb{N}\}$

8. $A = \{n \in \mathbb{N} \mid -81 \leq -6n \leq -40\} \setminus \{m \in \mathbb{Z} \mid m < 11\}$

9. $A = \{m \in \mathbb{Z} \mid -13 \leq 5m - 9 < 0\} \setminus \{-5, -4, -3, -2, -1, 0\}$

10. $A = \{n \in \mathbb{N} \mid -100 \leq -15n + 27 < -10\} \setminus \{0, 2, 4, 6, 8\}$