

1. Consider the following indexed sets:

$$A_1 = \{1\}$$

$$A_2 = \{2x : x \in \mathbb{N}, x > 1\}$$

$$A_3 = \{3x : x \in \mathbb{N}, x > 1\}$$

$$A_4 = \{4x : x \in \mathbb{N}, x > 1\}$$

⋮

(a) In a few words, describe the set $\bigcup_{i \in \mathbb{N}} A_i$.

(b) Suppose \mathbb{N} is the universal set. In just a few words, describe the set $\overline{\bigcup_{i \in \mathbb{N}} A_i}$.

2. In parts a-d below, a sentence or expression is given. For each, say whether it is a statement, an open sentence, or neither. Also say whether it is true or false, neither true nor false, or whether that depends on the circumstances.

	Sentence or expression	Statement? Open sentence? Neither?	True? False? Neither? Depends?
(a)	$\emptyset \in \mathcal{P}(\mathbb{Z}) - \mathcal{P}(\mathbb{N})$		
(b)	$\mathcal{P}(\mathbb{Z}) - \mathcal{P}(\mathbb{N})$		
(c)	There exist integers a and b for which $3a + 5b = 1$.		
(d)	There exist integers a and b for which $3a + 6b = 1$.		

3. Complete the truth tables.

(a)

P	Q	$P \vee Q$
T	T	
T	F	
F	T	
F	F	

(b)

P	Q	$P \wedge Q$
T	T	
T	F	
F	T	
F	F	

(c)

P	Q	$P \Rightarrow Q$
T	T	
T	F	
F	T	
F	F	

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⋮

(a) In a few words, describe the set $\bigcup_{i \in \mathbb{N}} A_i$.

(b) In just a few words, describe the set $\mathbb{N} - \bigcup_{i \in \mathbb{N}} A_i$.

2. In parts a-d below, a sentence or expression is given. For each, say whether it is a statement, an open sentence, or neither. Also say whether it is true or false, neither true nor false, or whether that depends on the circumstances.

	Sentence or expression	Statement? Open sentence? Neither?	True? False? Neither? Depends?
(a)	$\{-2, 0, 1\} \in \mathcal{P}(\mathbb{Z}) - \mathcal{P}(\mathbb{N})$		
(b)	$X \cup \bar{X}$		
(c)	$3a + 5b = 1$.		
(d)	There exist integers a and b for which $3a + 5b = 1$.		

3. Complete the truth tables.

(a)

P	Q	$P \wedge Q$
T	T	
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(b)

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