

CS311: Discrete Math for Computer Science, Spring 2015

Additional Exercises

Justify your answers.

1. In this problem, $A = \{1, 2, \dots, 10\}$, $B = \{10, 11, \dots, 20\}$, $C = \{2, 4, 6, \dots, 20\}$. Find the cardinalities of the sets

- (a) $A \cup C$,
- (b) $A \cap C$,
- (c) $(A \cup B) \setminus C$,
- (d) $(A \cap B) \setminus C$,
- (e) $(A \cap B) \times C$.

2. Find the cardinality of the set

$$(\{1, 2, \dots, 100\} \times \{1, 2, \dots, 101\}) \setminus (\{1, 2, \dots, 101\} \times \{1, 2, \dots, 100\}).$$

3. Find sets A and B such that

$$\begin{aligned}A \setminus B &= \{1, 5, 7, 8\}, \\B \setminus A &= \{2, 10\}, \\A \cap B &= \{3, 6, 9\}.\end{aligned}$$

4. Can you conclude that $A = B$ if A, B, C are sets such that

- (a) $A \cup C = B \cup C$?
- (b) $A \cap C = B \cap C$?

5. For any sets A and B , if $|A \times B| = 91$ then at least one of the sets A, B is a singleton. True or false?

6. Consider the relation $x = 2y + 1$ between real numbers x, y . Is it reflexive? Is it symmetric? Is it transitive?

7. What is the total number of binary relations on the set $\{1, \dots, 10\}$? How many of them are reflexive?