

You will receive 1/4 point for any question on which you answer 'E' for "I don't know".

Problem 1. For all finite sets X and Y , the formula $|X - Y| = |X| - |Y|$ holds.

- A) True B) False

Solution. B)

Problem 2. For all disjoint finite sets X and Y , the formula $|X \cup Y| = |X| + |Y|$ holds.

- A) True B) False

Solution. A)

Problem 3. Which of the following is true for *all* finite sets X and Y ?

- A) $0 \leq |X \cup Y| \leq |X|$
B) $|X| \leq |X \cup Y| \leq |X| + |Y|$
C) $|X| + |Y| \leq |X \cup Y|$
D) All of the above

Solution. B)

Problem 4. Suppose that X , Y , and Z are sets. If $X \subset Y$ then $X \times Z \subset Y \times Z$.

- A) True B) False

Solution. A)

Problem 5. For any sets X and Y , the sets $X \times \{1\}$ and $Y \times \{2\}$ are disjoint.

- A) True B) False

Solution. A)

Problem 6. Suppose that A is a finite set with a elements. How many elements does $A \times A$ have?

- A) a B) $2a$ C) a^2 D) ∞

Solution. C)

Problem 7. Let X be the set of integers that are divisible by 2, let Y be the set of integers that are divisible by 3, and let Z be the set of integers that are divisible by 6. Which of the following are true?

- A) $X \cap Y \subset Z$
B) $Z \subset X \cap Y$
C) Both
D) Neither

Solution. C)