

**Problem 1.** Let  $S$  be a set with three subsets  $A$ ,  $B$ , and  $C$ . Suppose that  $x$  is an element of  $S$ . How many of the sets

$$A, B, C, A \cap B, A \cap C, B \cap C, A \cap B \cap C$$

could contain  $x$ ? Answer as precisely as possible.

- A) 1
- B) 7
- C) an even number
- D) an odd number
- E) Any number between 1 and 7

*Solution.*

□

**Problem 2.** How many of the integers  $x$  with  $1 \leq x \leq 100$  are divisible by 2 or by 5?

- A) 20
- B) 50
- C) 60
- D) 70
- E) 80

**Problem 3.** How many ways are there to rearrange the list  $(1, 2, 3, 4, 5)$  such that 1, 3, and 5 do not wind up in the same place?

- A)  $2! = 2$
- B)  $5! - 5 \times 4! + 10 \times 3! - 10 \times 2! + 5 \times 1! = 120 - 120 + 60 - 20 + 5 = 45$
- C)  $5! - 3 \times 4! + 3 \times 3! - 2! = 120 - 72 + 18 - 2 = 64$
- D)  $5! = 120$