Section 1.2: The Number of Elements in a Set/Venn Diagrams

Example: If $A = \{1, 3, 5\}$ and $B = \{3, 4, 5, 6\}$ compute the following.

$n(A) = 3$  
$n(B) = 4$  
$n(A \cap B) = 2$

$n(A \cup B) = 5$

$A \cap B = \{3, 5\}$

$A \cup B = \{1, 3, 4, 5, 6\}$

Union Formulas:

\[ n(A \cup B) = n(A) + n(B) - n(A \cap B) \]
Example: Suppose we survey 60 shoppers about two products: A and B.

- 30 shoppers bought product A
- 20 shoppers bought product B
- 9 shoppers bought product A and product B

A) Fill in a Venn Diagram that represents this information.
B) How many shoppers bought product A but not B?
21

C) How many shoppers bought product A or B?
21 + 7 + 11

D) How many shoppers bought at least one product?
21 + 11 + 9

E) How many shoppers bought exactly one product?
21 + 11

F) How many shoppers bought neither of these products?
19
Example: If \( n(U) = 500 \) and \( n(A \cup B) = 300 \), what is \( n(A^c \cap B^c) \)?
Example: Suppose we poll 100 people with 3 yes/no questions.

- 22 people answered no to all three questions.
- 45 answered yes to question 1.
- 25 answered yes to question 2.
- 32 answered yes to question 3.
- 6 answered yes to only question 1 and question 3.
- 12 answered yes to question 2 and question 3.
- 2 answered yes to all three questions.

A) Fill in a Venn Diagram that represents this information.
B) How many people answered yes to question 2 or question 3?

$$4 + 9 + 2 + 10 + 6 + 14$$

C) How many people answered yes to at most one question?

$$33 + 9 + 14 + 22$$

D) How many people answered yes to question 2 but not question 1?

$$9 + 10$$

E) How many people answered yes to exactly 2 questions?

$$6 + 4 + 10$$