

Section 6.2 - The Number of Elements in a Finite Set

Let A be a set, then $n(A)$ is the

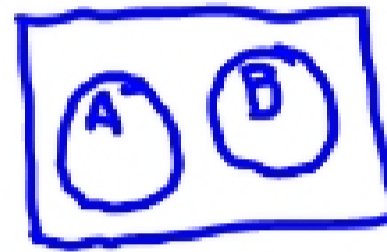
Example 1: Let $A = \{1, 2, 3, \dots, 19, 20\}$ and $B = \{q, s, t, v\}$.

Find:

a. $n(A) = 20$

b. $n(B) = 4$

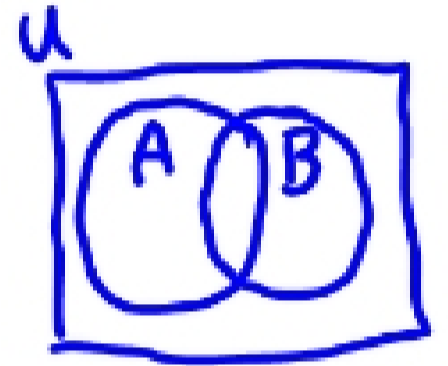
c. $n(\emptyset) = 0$



Given two sets A and B :

1. If A and B are disjoint then $n(A \cup B) = n(A) + n(B)$.

2. If A and B are not disjoint then $n(A \cup B) = n(A) + n(B) - n(A \cap B)$



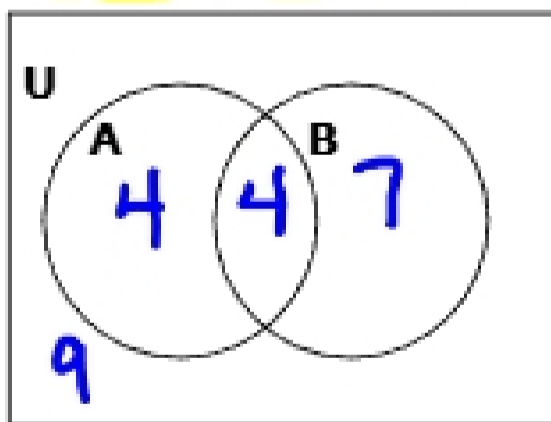
Example 2: Let A and B be subsets of a universal set U . Given that $n(B) = 9$, $n(A \cap B) = 5$, and $n(A \cup B) = 20$, find $n(A)$.

$$n(A \cup B) = n(A) + n(B) - n(A \cap B)$$

$$20 = n(A) + 9 - 5$$

$$n(A) = 20 - 9 + 5 = 16$$

Example 3: Let A and B be subsets of a universal set U . Given that $n(A) = 8$, $n(A^c \cap B) = 7$, $n(A \cap B) = 4$, and $n(A \cup B)^c = 9$, find $n(A \cup B^c)$.

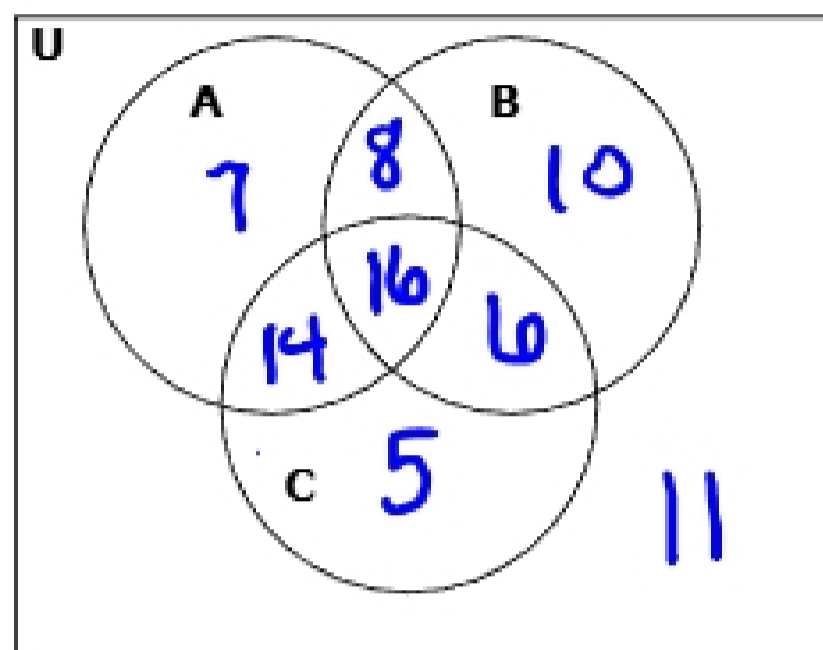


$$\begin{aligned} n(A) &= 4 + 4 \\ n(B^c) &= 4 + 9 \end{aligned} \left. \vphantom{\begin{aligned} n(A) &= 4 + 4 \\ n(B^c) &= 4 + 9 \end{aligned}} \right\} \text{no duplicates}$$

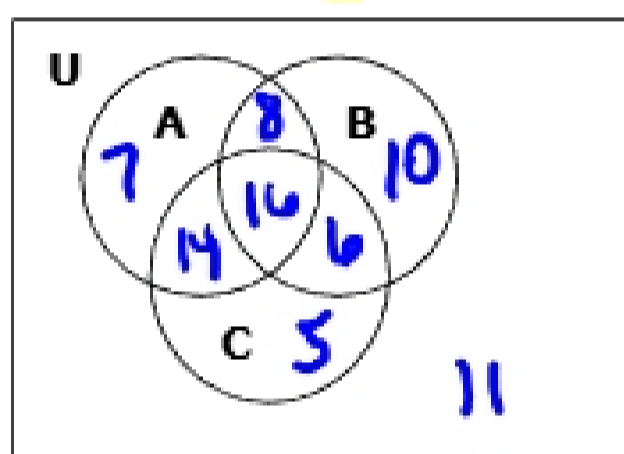
$$n(A \cup B^c) = 4 + 4 + 9 = 17$$

$$\begin{aligned} n(A \cup B^c) &= n(A) + n(B^c) - n(A \cap B^c) \\ &= 8 + (4 + 9) - 4 \\ &= 17 \end{aligned}$$

Example 4: Let $n(U) = 77$, $n(A) = 45$, $n(B) = 40$, $n(C) = 41$, $n(A \cap B) = 24$, $n(B \cap C) = 22$, $n(A \cap C) = 30$, and $n(A \cap B \cap C) = 16$. Find the number in each of the following sets.



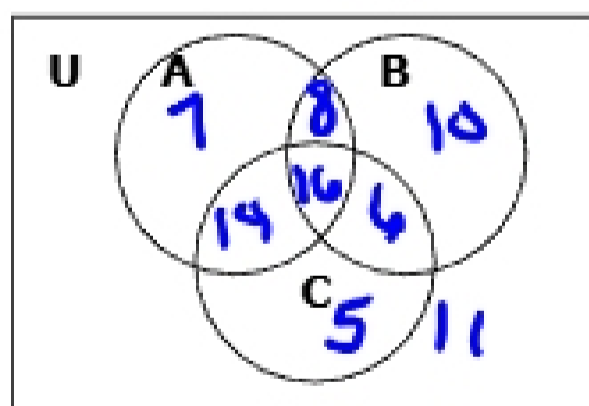
a. $n[(A \cup B) \cap C] =$



$n(A \cup B) = 7 + 8 + 10 + 14 + 16 + 6$ } in both
 $n(C) = 14 + 16 + 6 + 5$

$n[(A \cup B) \cap C] = 14 + 16 + 6 = 36$

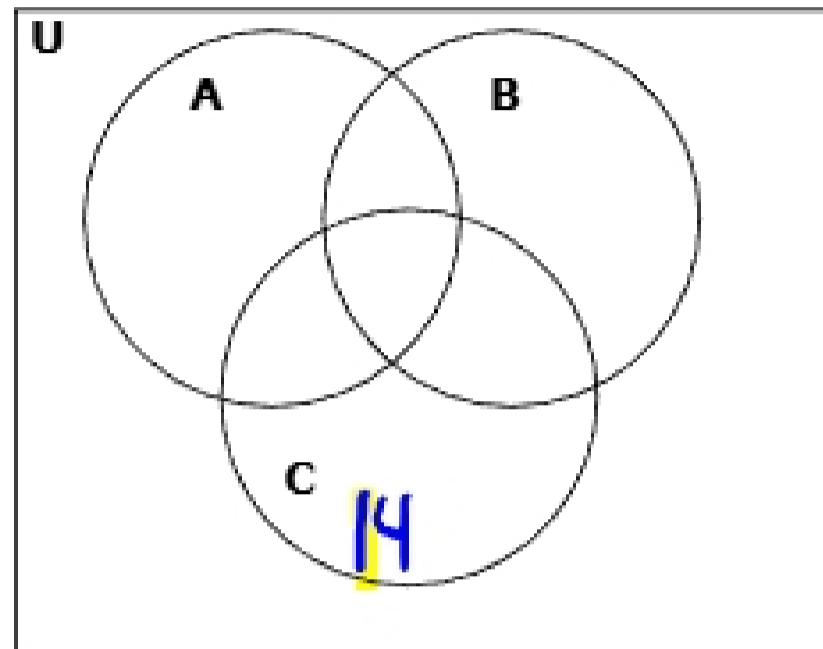
b. $n[(B \cap C)^c \cup A] =$



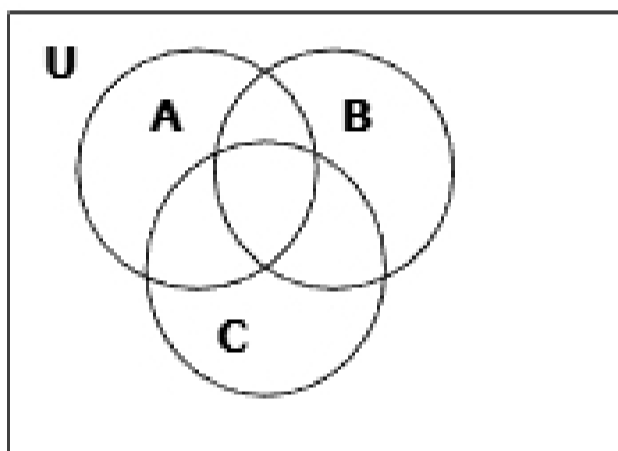
$n(B \cap C)^c = 7 + 8 + 10 + 14 + 5 + 11$ } no duplic.
 $n(A) = 7 + 8 + 14 + 16$

$n[(B \cap C)^c \cup A] = 7 + 8 + 10 + 14 + 5 + 11 + 16 = 71$

Example 4: Let $n(U) = 77$, $n(A) = 45$, $n(B) = 40$, $n(C) = 41$, $n(A \cap B) = 24$, $n(B \cap C) = 22$, $n(A \cap C) = 30$, and $n(A \cap B \cap C) = 16$. Find the number in each of the following sets.



a. $n[(A \cup B) \cap C] =$



b. $n[(B \cap C)^c \cup A] =$

