

1. There are 134 students in our finite math class. Consider the following subsets of students:

$A = \{\text{students who like apricots}\}$

$B = \{\text{students who like bagels}\}$

$C = \{\text{students who like candy}\}$.

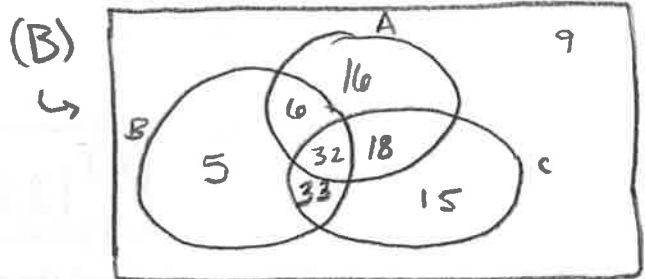
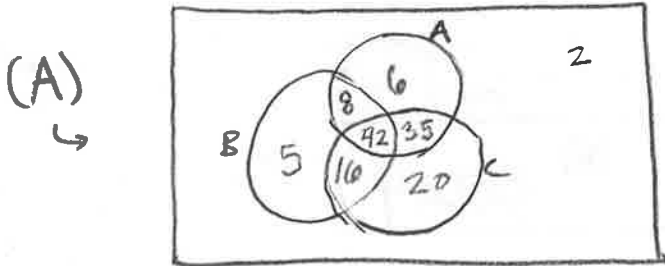
(A) Given that

$$\begin{aligned} n(U) &= 134 & n(A) &= 91 & n(B) &= 71 \\ n(C) &= 113 & n(A' \cap B' \cap C') &= 2 & n(A \cap B \cap C) &= 42 \\ n(A \cap B \cap C') &= 8 & n(A' \cap B \cap C') &= 5 & n(A' \cap B' \cap C) &= 20, \end{aligned}$$

(B) Given that

$$\begin{aligned} n(U) &= 134 & n(A) &= 72 & n(B) &= 76 \\ n(C) &= 98 & n(A' \cap B' \cap C') &= 9 & n(A \cap B \cap C) &= 32 \\ n(A \cap B \cap C') &= 6 & n(A' \cap B \cap C') &= 5 & n(A' \cap B' \cap C) &= 15, \end{aligned}$$

(a) draw a Venn diagram which portrays the situation and use it to answer the questions. (5 pts.)



(b) How many basic regions are there in the Venn diagram? (5 pts.)

(A) & (B) 8

(c) How many students like bagels or candy? (8 pts.)

(A) 126 (B) 109

(d) How many students like apricots or candy, but not bagels? (8 pts.)

(A) 61 (B) 49

2. While on break you took 9 pictures of your vacation. (8 pts. each)

(a) (A) How many ways can you pick 4 pictures and arrange them in a line on the wall?

(a) (B) How many ways can you pick 5 pictures to give to your Mom?

(A) 3024 (B) 126

(b) (A) How many ways can you pick 5 pictures to give to your Mom?

(c) (B) How many ways can you pick 4 pictures and arrange them in a line on the wall?

(A) 126 (B) 3024

3. You toss a coin 6 times and record the number of heads and tails. How many possible outcomes contain two or more heads? (10 pts.)

(A) & (B) 57

4. Short answer section.

(3 pts. each)

(i) (A) $C(5, 1) = 5$

(i) (B) $C(10, 2) = 45$

(ii) (A) $P(10, 10) = 3628800$

(ii) (B) The number of subsets of $\{a, b, c\}$ is 8

(iii) (A) The number of subsets of $\{a, b, c\}$ is 8

(iii) (B) $U \cap \emptyset = \emptyset$

(iv) (A)(B) If $A = \{a, b, c, e\}$ and $B = \{a, d, e, f\}$, then $A \cap B$ is $\{a, e\}$

(v) (A) $U \cap \emptyset = \emptyset$

(v) (B) $P(8, 3) = 336$

(vi) (A) The coefficient of x^3y^2 in the binomial expansion of $(x + y)^5$ is 10

(vi) (B) $P(10, 10) = 3628800$

(vii) (A) $C(10, 2) = 45$

(vii) (B) The coefficient of x^3y^2 in the binomial expansion of $(x + y)^5$ is 10

(viii) (A) $P(8, 3) = 336$

(viii) (B) $C(5, 1) = 5$

5. True and false questions.

(4 pts. each)

- (i) There are exactly 16 subsets of $\{a, b, c, d, e, f\}$ that contain $\{a, b\}$ as a subset.

TRUE FALSE

- (ii) There are 1260 9-digit numbers that contain 4 zeros, 3 ones, and 2 twos.

TRUE FALSE

(iii) $\binom{16}{4} = \binom{16}{12}$

TRUE FALSE

- (iv) If $A \subseteq B$, then $n(A \cup B)$ equals $n(A) + n(B)$.

TRUE FALSE

- (v) The number of terms in the binomial expansion of $(x - y)^{18}$ is 19.

TRUE FALSE

- (vi) The number of poker hands that contain four of a kind is $C(13, 1) \cdot C(4, 1) \cdot C(12, 1)$.

TRUE FALSE