

TEST A

CHAPTER 1, SETS AND PROBLEM SOLVING

if:

1. Let $n(A) = 20$ and $n(B) = 10$. Find $n(A \cap B)$

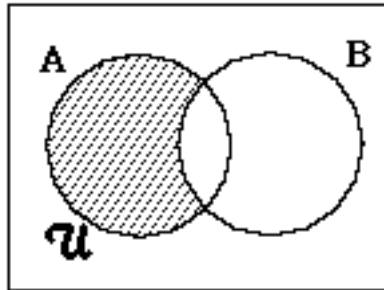
- a. $n(A \cap B) = 0$
- b. $n(A \cup B) = 5$

Find:

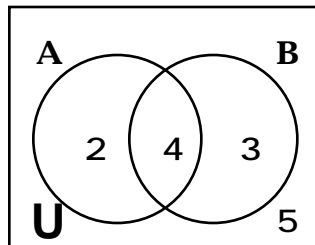
2. Let $n(A) = 24$, $n(B) = 12$, and $n(A \cap B) = 32$.

- a. $n(A \cup B)$
- b. $n(U)$ if $n(A' \cap B') = 6$

3. In the figure, the circular regions represent the sets A and B, and the rectangular region represents U. What set is represented by the shaded region in the diagram?



4. The figure shows the number of elements in the sets represented by the various regions in the diagram. Find the number of elements in the set A



5. Upon checking 100 students, it is found that 40 are taking mathematics, 60 are taking biology, 50 are taking chemistry, 25 are taking mathematics and biology, 20 are taking mathematics and chemistry, 22 are taking biology and chemistry, and 10 are taking all three of these subjects.

- a. How many are taking mathematics but neither of the other two subjects?
- b. How many are taking chemistry but not biology?
- c. How many are taking none of the three subjects?

6. Show that the cardinal number of the sequence $2, 4, 8, \dots, n^2, \dots$ is the same as the cardinal number of the sequence $1, 2, 3, \dots, n, \dots$

7. Identify the pattern and find the next three terms: $2, 7, 15, 26, 40, 57, \dots$

8. Use set notation and list the elements of the set $\{x \mid x \text{ is a positive even integer less than } 10\}$.

9. Write the following sets verbally and using set builder notation

a. $\{4, 6, 8, \dots\}$

b. $\{3, 5, 7, \dots\}$

10. Write all the subsets of the set $\{1, 2, 3\}$.

11. Identify each of the following as the union of sets A and B, the intersection of sets A and B, or a difference of sets A and B.

a. $\{x \mid x \in A \text{ and } x \in B\}$

b. $\{x \mid x \in A \text{ and } x \in B\}$

c. $\{x \mid x \in A \text{ and/or } x \in B\}$

12. Let $U = \{a, b, c, d, e\}$, $A = \{a, c, e\}$ and $B = \{b, c, d\}$. Find:

- a. B'
- b. $A \cap B$
- c. $(A \cup B)'$
- d. $U - (A \cap B)$
- e. $A \cap B'$

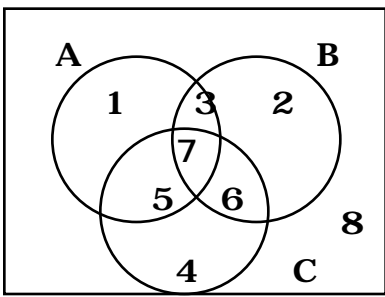
13. Let U , A and B be as in Problem 12, and let $C = \{b, d, e\}$. Find:

- a. $(A \cap B) \cap C$
- b. $(A' \cap B) \cap C'$

14. Use a pair of Venn Diagrams to show that $(A \cap B)' = A' \cup B'$.

15. Draw a Venn diagram to illustrate the set $A' \cap B' \cap C'$.

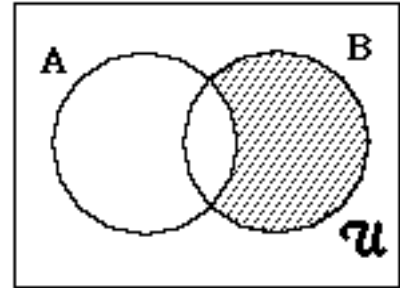
16. Find the numbered regions in the figure that represent the following sets:



- a. $A \cap B' \cap C$
- b. $(A \cap B) \cap C$
- c. $B - A$
- d. $(B \cap C) \cap (A \cap C)$

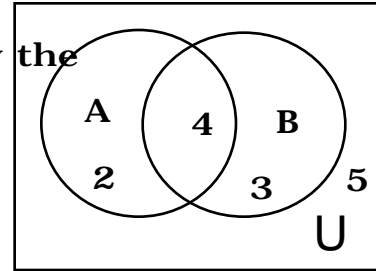
8. In the figure, the shaded region represents the set:

- a. $A \cap B'$ b. $A' \cap B$
 c. $A' \cap B'$ d. $A \cap B$
 e. None of these



9. The figure shows the number of elements in the sets represented by the various regions in the figure. The number of elements in A' is

- a. 9 b. 2 c. 8
 d. 4 e. 7



10. In the figure, $n(A \cap B')$ =

- a. 9 b. 8 c. 7 d. 6 e. 5

11. Upon checking 100 students, it is found that 40 are taking mathematics, 60 are taking biology, 50 are taking chemistry, 25 are taking mathematics and biology, 20 are taking mathematics and chemistry, 22 are taking biology and chemistry, and 10 are taking all three of these subjects. The number of students taking none of the three subjects is:

- a. 0 b. 1 c. 3 d. 5 e. 7

12. Which of the following is correct?

- $A' \cap B' =$
 a. $(A \cap B)'$ b. $(A \cup B)'$ c. $A \cap B$
 d. $A' \cap B'$ e. None of these.

13. Which of the following is correct?

- $A \cap (B \cap C) =$
 a. $(A \cap B) \cap C$ b. $A \cap (B \cap C)$ c. $(A \cap B) \cap C$
 d. $(A \cap B) \cap (A \cap C)$ e. None of these

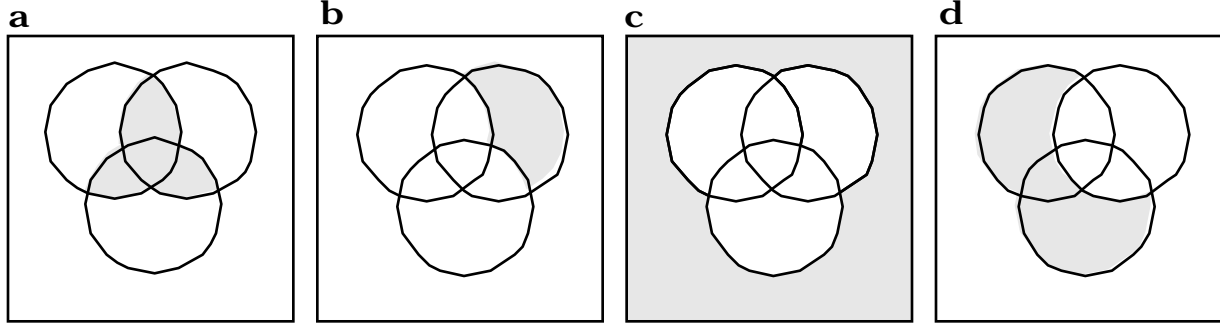
14. For the sequence 3, 8, 16, 27, 41, . . . , the next three terms are

- a. 51, 72, 85 b. 60, 75, 90 c. 58, 78, 101
 d. 58, 75, 93 e. None of these

15. The set of elements in $\{x \mid x \text{ is a positive odd integer less than } 5\}$ is
- $\{1, 2, 3, 4\}$
 - $\{1, 3, 5\}$
 - $\{1, 3\}$
 - $\{ \dots, -1, 1, 3\}$
 - None of these
16. The set $\{3, 5, 7, \dots\}$ is:
- The set of all odd integers.
 - The set of all positive odd integers.
 - The set of all odd natural numbers.
 - The set of all positive odd integers greater or equal to 3.
 - None of these
17. All the subsets of $\{1, 2, 3\}$ are:
- $\{1\}, \{2\}, \{3\}, \{1, 2\}, \{1, 3\}, \{2, 3\}$
 - $\{1\}, \{2\}, \{3\}, \{1, 2\}, \{1, 3\}, \{2, 3\}, \{1, 2, 3\}$
 - $\emptyset, \{1\}, \{2\}, \{3\}, \{1, 2\}, \{1, 3\}, \{2, 3\}$
 - $\emptyset, \{1\}, \{2\}, \{3\}, \{1, 2\}, \{1, 3\}, \{2, 3\}, \{1, 2, 3\}$
 - None of these

THE FOLLOWING SETS ARE TO BE USED IN PROBLEMS 18, 19, 20.
 A AND B ARE SUBSETS OF A UNIVERSAL SET U

- $\{x \mid x \in A \text{ and } x \notin B\}$
 - $\{x \mid x \notin A \text{ and } x \in B\}$
 - $\{x \mid x \notin A \text{ and } x \notin B\}$
 - $\{x \mid x \in A \text{ and/or } x \in B\}$
 - $\{x \mid x \in B\}$
18. Which one of these sets is the set $(A \cap B)'$? a b c d e
19. Which one of these sets is the set $A \cap B'$? a b c d e
20. If $U = \{a, b, c, d, e\}$, $A = \{a, c, e\}$ and $B = \{a, d, e\}$, then $(A \cap B)' =$
- $\{b, c, d\}$
 - $\{b\}$
 - $\{a, e\}$
 - $\{a, c, d, e\}$
 - None of these
21. If U, A and B are as in Problem 20 and $C = \{b, c, e\}$. Then $(A \cap B) \cap C' =$
- U
 - $\{a, d\}$
 - $\{a, b, d, e\}$
 - \emptyset
 - None of these
22. A Venn diagram that illustrates the set $(A \cap B) \cap B'$ is:



e. None of these