

## 10.1.1: Sets and Venn Diagrams (Exercises)

### SECTION 10.1 PROBLEM SET: SETS AND Venn Diagrams

Find the indicated sets.

1. List all subsets of the following set. $\{ \text{Al, Bob} \}$	2. List all subsets of the following set. $\{ \text{Al, Bob, Chris} \}$
3. List the elements of the following set. $\{ \text{Al, Bob, Chris, Dave} \} \cap \{ \text{Bob, Chris, Dave, Ed} \}$	4. List the elements of the following set. $\{ \text{Al, Bob, Chris, Dave} \} \cup \{ \text{Bob, Chris, Dave, Ed} \}$

Problems 5 – 8: Let Universal set  $U = \{ a, b, c, d, e, f, g, h, i, j \}$ , sets  $V = \{ a, e, i, f, h \}$ ,  $W = \{ a, c, e, g, i \}$ . List the members of the following sets.

5. $V \cup W$	6. $V \cap W$
7. $\overline{V \cup W}$	8. $\overline{V} \cap \overline{W}$

Problems 9 – 12: Let Universal set  $U = \{ 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 \}$  and sets  $A = \{ 1, 2, 3, 4, 5 \}$ ,  $B = \{ 1, 3, 4, 6 \}$ , and  $C = \{ 2, 4, 6 \}$ .

List the members of the following sets.

9. $A \cup B$	10. $A \cap C$
11. $\overline{A \cup B} \cap C$	12. $\overline{A} \cup \overline{B \cap C}$

Use Venn Diagrams to find the number of elements in the following sets.

13. In Mrs. Yamamoto's class of 35 students, 12 students are taking history, 18 are taking English, and 4 are taking both. Draw a Venn diagram and use it determine how many students are taking neither history nor English.	14. In a survey of 1200 college students, 700 used Spotify to listen to music and 400 used iTunes to listen to music; of these, 100 used both. a. Draw a Venn Diagram and find the number of people in each region of the diagram. b. How many used either Spotify or iTunes?
15. A survey of athletes revealed that for their minor aches and pains, 30 used aspirin, 50 used ibuprofen, and 15 used both. How many athletes were surveyed?	16. In 2016, 80 college students were surveyed about what video services they subscribed to. Suppose the survey showed that 50 use Amazon Prime, 30 use Netflix, 20 use Hulu. Of those, 13 use Amazon Prime and Netflix, 9 use Amazon Prime and Hulu, 7 use Netflix and Hulu. 3 students use all three services. a. Draw a Venn Diagram and use it to determine the number of people in each region of the diagram. b. How many use at least one of these? c. How many use none of these?

17. A survey of 100 students at a college finds that 50 take math, 40 take English, and 30 take history. Of these 15 take English and math, 10 take English and history, 10 take math and history, and 5 take all three subjects. Draw a Venn diagram and find the numbers in each region. Use the diagram to answer the questions below.
- Find the number of students taking math but not the other two subjects.
  - The number of students taking English or math but not history.
  - The number of students taking none of these subjects.

18. In a survey of investors it was found that 100 invested in stocks, 60 in mutual funds, and 50 in bonds. Of these, 35 invested in stocks and mutual funds, 30 in mutual funds and bonds, 28 in stocks and bonds, and 20 in all three. Draw a Venn diagram and find the numbers in each region. Use the diagram to answer the questions below.
- Find the number of investors that participated in the survey.
  - How many invested in stocks or mutual funds but not in bonds?
  - How many invested in exactly one type of investment?

19. A survey of 100 students at a college finds that 50 take math, 40 take English, and 30 take history. Of these 15 take English and math, 10 take English and history, 10 take math and history, and 5 take all three subjects. (This question relates back to question #17.) For each of the following draw a Venn Diagram and shade the indicated sets and determine the number of students in the set.

a. Students who take at least one of these classes	b. Students who take exactly one of these classes
c. Students who take at least two of these classes	d. Students who take exactly two of these classes
e. Students who take at most two of these classes	f. Students who take English or Math but not both
g. Students who take Math or History but not English	h. Students who take all of these classes

20. In a survey of investors it was found that 100 invested in stocks, 60 in mutual funds, and 50 in bonds. Of these, 35 invested in stocks and mutual funds, 30 in mutual funds and bonds, 28 in stocks and bonds, and 20 in all three. (This question relates back to question #18.) For each of the following draw a Venn Diagram and shade the indicated sets and determine the number of students in the set.

a. Investors who invested in mutual funds only	b. Investors who invested in stocks and bonds but not mutual funds
c. Investors who invested in exactly one of these investments	d. Investors who invested in exactly two of these investments
e. Investors who invested in at least two of these investments	f. Investors who invested in at most two of these investments
g. Investors who did not invest in bonds	h. Investors who invested in all three investments

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