

Math 129 Problem Solving Using Set Theory

1. Students Poll.

In an interview of 50 students

12 liked Proposition 8 and Proposition 13.

18 liked Proposition 8, but not Proposition 5.

4 liked Proposition 8, Proposition 13, and Proposition 5.

25 liked Proposition 8.

15 liked Proposition 13.

10 liked Proposition 5, but not Proposition 8 or Proposition 13.

1 liked Proposition 13 and Proposition 5, but not Proposition 8.

a) Show the complete Venn Diagram.

b) Of those surveyed, how many did not like any of the three propositions?

c) How many liked Proposition 8 and proposition 5?

2. Blood Types.

Blood types can be illustrated by a Venn Diagram. There are three antigens, A, B, and Rh, that may or may not be present in any human's blood. If you have the A antigen or the B antigen in your blood, that letter appears in your blood type. If you have neither the A nor the B antigen in your blood, then the letter O appears in your blood type. If you have the Rh antigen in your blood, a plus sign appears (+) in your blood type. If you don't have Rh, a minus sign appears in your blood type (-).

a) Show the different blood types in a Venn diagram.

b) The approximate percents of each blood type in the world are given in figure (1). Fill in these percents in the appropriate regions of the Venn Diagram

c) The chart on figure (2) can be used for transfusions. Which blood type is the "universal donor?"

	A	O	B	AB
+	37%	32%	11%	5%
-	6%	6.5%	2%	0.5%

Figure (1)

Blood Type	O	A	B	AB
Can Receive	O	A, O	B, O	A, B, AB, O

Figure (2)

2. TV Poll.

Matt E. Matic was applying for a job. To determine whether he could handle the job, the personnel manager sent him to poll 100 people about their favorite types of TV shows. His data were as follows:

- 59 preferred comedies
- 38 preferred variety shows
- 42 preferred drama
- 18 preferred comedies and variety shows
- 12 preferred variety and drama
- 16 preferred comedies and drama
- 7 liked all types
- 2 did not like any of these TV shows.

On the basis of this survey, would you hire Matt?

4. In the following exercises, decide if the given statement is always true. Draw a Venn diagram to support your answer. If the statement is not always true, give a counterexample.

a) If $A \subseteq B$ then $n(A) < n(B)$

b) If $A \subseteq B$ and $B \subseteq A$ then $A=B$

c) If $A \cup B = A \cap B$ then $A=B$

d) $A \subset (A \cup B)$

e) $n(A) \leq n(A \cup B)$

