## Survey Problems   (Section 1.6)

Survey problems (and similarly structured problems) are logic problems that are often found in real world situations. The logic of survey problems can be used either to
- Find missing values in data
- Determine whether there is data missing or not

They also appear on professional examinations like LSAT and MCAT and the GRE. They are considered an excellent way to evaluate a person's ability to think logically.

Drawing a Venn diagram for a survey problem can take a complicated mess of words and numbers and turn it into an organized, manageable problem.

Example: A survey was made of 200 city residents to study their use of mass transit facilities. According to the survey 76 used the train, 60 used the subway, and 34 used the bus. 6 used the train and bus, 12 used the bus and subway, and 12 used the train and subway. 4 reported using all three methods of mass transit. How many did not use mass transit at all?
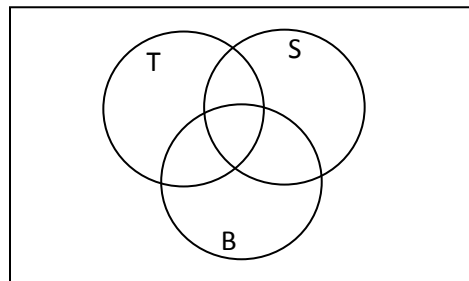
Determine which numbered regions make up the indicated set.

1. X _____

2. $X - Y$ _____

3. $W \cup Y$ _____

4. $(W \cup X)'$ _____

5. $X - (W \cap Y)$ _____

6. $U - (W \cap Y)'$ _____
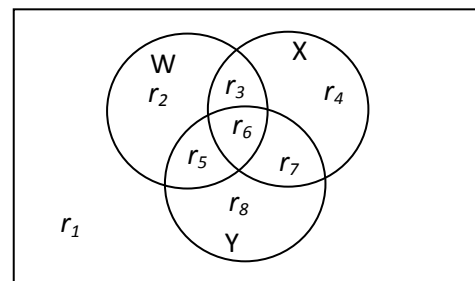
Practice 1: In a certain group of 75 students, 16 students are taking psychology, geology, and English; 24 students are taking psychology and geology; 30 students are taking psychology and English; and 22 students are taking geology and English. However, 7 students are only taking psychology, 10 students are taking only geology, and 5 students are taking only English.

     a. How many of these students are taking psychology?

     b. How many of these students are taking psychology and English, but not geology

     c. How many students in this group are not taking any of these three subjects?

Practice 2: At a meeting of 50 car dealers, the following information was obtained; 12 dealers sold Buicks, 15 dealers sold Toyotas, 16 dealers sold Pontiacs, 4 dealers sold both Buicks and Toyotas, 6 dealers sold both Toyotas and Pontiacs, 5 dealers sold both Buicks and Pontiacs, and one dealer sold all three brands.

     a. How many dealers sold Buicks and neither of the other two brands?

     b. How many of the dealers at the meeting did not sell any of these brands of cars?

Practice 3: In a recent survey of 300 people regarding television programming, the following information was gathered: 160 people watched ABC, 150 people watched CBS, and 150 people watched NBC, while 90 people watched both ABC and CBS, 70 people watched CBS and NBC, and 100 people watched ABC and NBC. Forty people watched all three networks.

     a. How many people watched ABC or NBC?
     b. How many people watched only one of the networks?

     c. How many people did not watch any of the networks?

     a. How many people did not watch NBC?

Practice 4: In a recent survey of parents of 160 third graders regarding the extracurricular activities their children are in, the following information was gathered:

28 children were in gymnastics

60 children were in dance

99 children were in swimming

13 children were in gymnastics and dance

21 children were in dance and swimming

19 children were in swimming and gymnastics

9 children were in all three activities

a. How many children were ONLY in dance and no other activity?

b. How many children were in dance or swimming? (Remember what "or" means)

c. How many children were in <u>at least one</u> of these activities?

d. How many children were <u>in at most two</u> of these activities?