

## Section 2.2 – Sets, Counting, and the Whole Numbers

1. (a) You are to set up a seating arrangement for your class of fourteen students. If your classroom has exactly fourteen chairs, how many different seating arrangements can you choose from?

$$14! = 14 \cdot 13 \cdot 12 \cdot 11 \cdot \dots \cdot 3 \cdot 2 \cdot 1 = 87,178,291,200$$

You have 87,178,291,200 seating arrangements to choose from.

- (b) Generalize your conclusions.

Two sets, each of cardinality  $n$ , can have  $n!$  distinct one-to-one correspondences set up between them.

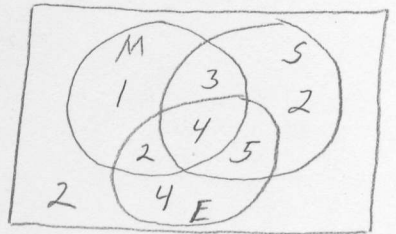
- (c) What concepts from this section were used?

Sets and 1-1 correspondence were used for this problem.

2. A survey of a fourth-grade class resulted in the following information:

10 liked mathematics  
14 liked social studies  
15 liked English  
4 liked all three

7 liked mathematics and social studies  
6 liked mathematics and English  
9 liked social studies and English  
2 liked none of these three



- (a) How many students were in the class?

$$n(U) = 23 \quad \text{The 4th grade class has 23 students.}$$

- (b) How many students liked English or social studies?

$$n(E \cup S) = 20 \quad \text{Twenty students liked English or social studies.}$$

- (c) How many only liked mathematics?

$$n(M - (E \cup S)) = 1 \quad \text{One student liked only mathematics.}$$

- (d) How many liked English, but not mathematics?

$$n(E - M) = 9 \quad \text{Nine students liked English, but not mathematics.}$$

- (e) How many liked mathematics and social studies, but not English?

$$n((M \cap S) - E) = 3 \quad \text{Three students liked mathematics and social studies, but not English.}$$

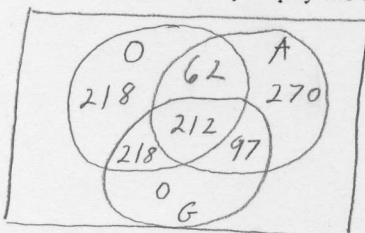
2. You, as a representative of a company selling healthy drinks, are interested in putting a dispensers in the Student Union. The company is interested in finding out how many people like orange juice, apple juice, and grape juice. You hire someone for \$50 to poll 1000 students. You observe your helper and see the person loafing around most of the time. Later the person comes to you with the results of the poll as follows:

orange juice – 710  
apple juice – 641  
grape juice – 527

orange and apple – 274  
orange and grape – 430  
apple and grape – 309

All three – 212

You, being a skeptic, have serious doubts about how the figures were obtained, but agree to pay the \$50 if the figures "add up." Would you pay the \$50? Justify.



$$218 + 62 + 270 + 218 + 212 + 97 = 1077 \neq 1000 = n(U).$$

You would not pay them the \$50 since the numbers must be incorrect. The total is 77 more than the number polled.