

## COUNTING: 5.4-5.5

MA 114 FINITE MATH

### 1. WARM-UP

A survey of 100 investors in stocks and bonds revealed that 80 investors owned stocks and 70 owned bonds. How many investors owned both stocks and bonds?

### 2. COUNTING WITH VENN DIAGRAMS

The three most common colors in the 193 flags of the member nations of the United Nations are red, white and blue.

Draw a three circle Venn diagram with set  $U$ , the set of all flags of the member nations of the United Nations, set  $W$  for flags with white,  $R$  for the set of flags with red, and  $B$  for the set of flags with blue.

- 145 flags contain red
- 132 flags contain white
- 104 flags contain blue
- 103 flags contain both red and white
- 66 flags contain both red and blue
- 73 flags contain both white and blue
- 52 flags have all three colors

**Problem 1.** *How many flags contain exactly two colors?*

**Problem 2.** *How many flags contain none of the three colors?*

### 3. PERMUTATIONS AND COMBINATIONS

- (1) Choose 4 M&M's with different colors. How many ways can you put them in order? Write them all down.
  - (a) How could you find this answer using the multiplication principle.
  - (b) Make a tree diagram to verify your answer.
  
- (2) Choose 5 different M&M's (color doesn't matter here). This is your set  $S$ .
  - (a) How many subsets of size 1 does  $S$  have?
  - (b) How many subsets of size two does  $S$  have?
  - (c) How many subsets of size three does  $S$  have?
  - (d) How many subsets of size 4 does  $S$  have?
  - (e) How many subsets of size 5 does  $S$  have?
  - (f) In how many ways can you pick 3 elements out of your set of 5, and put them in order?
  - (g) Which is bigger a bigger number  $P(5, 2)$  or  $C(5, 2)$ ?
  - (h) Challenge: Which is bigger:  $P(n, r)$  or  $C(n, r)$ ?