

## MATH 126: General Counting Problems

**General Advice:** The problems here are a step above the others we have studied. They may still use the Fundamental Theorem of Counting, Permutations, and Combinations but may do so in less obvious ways.

1. A cafeteria offers a selection of four meats, six vegetables, and five desserts. In how many ways can you select a meal consisting of two different meats, three different vegetables, and two different desserts?

①  $4C2 = 6$   $6C3 = 20$   $5C2 = 10$   $4! * 3! * 2! * 1! * 4!$   
 $24 * 6 * 2 * 24 = 6912$

$$\frac{6}{M} \cdot \frac{20}{V} \cdot \frac{10}{D} = 1200$$

2. A four-person crew for the international space station is to be chosen from a candidate pool of 10 Americans and 12 Russians. How many different crews are possible if there must be at least two Russians?

2 Russians:  $12C2 \cdot 10C2 \leftarrow \text{FTOC}$  = 2970  
3 Russians:  $12C3 \cdot 10C1$  = 2200  
4 Russians:  $12C4 \cdot 10C0$  = 495

5665

3. Mr. Jones has 10 books to put on his bookshelf. Of these, 4 are mathematics books, 3 are chemistry, 2 are history, and 1 is a language book. Jones wants to arrange them on the shelf so that all books dealing with the same subject are together on the shelf. How many different arrangements are possible?

**Answer for #3 is with #1 (see the photo).**

4. From a group of 5 women and 7 men, how many different committees consisting of 2 women and 3 men can be formed? What if two of the men are feuding and refuse to serve together on the committee?

