

### Some Extra Counting Problems

**Problem 1** A basketball team has 5 players over six feet tall and 6 who are under 6 feet tall. How many ways can they have their picture taken if the 5 taller players stand in a row behind the 6 shorter players who are sitting in a row of chairs?

**Problem 2** A club with 50 members is going to form two committees, one with 8 members and the other with 7. How many ways can this be done (a) if the committees must be disjoint? (b) if they can overlap?

**Problem 3** Consider a deck of cards, where each card is characterized by a number and a color. The numbers vary from 1 to 10, and the colors are red, green, blue and yellow (so there are 40 cards in the deck). Suppose we choose 4 cards at random. What is the probability that we get three of the same number (i.e. three ones, three fours, three sixes, etc.)?

**Problem 4** How many ways can 5 history books, 3 math books, and 4 novels be arranged on a shelf if the books of each type must be together?

**Problem 5** Nine impact wrenches are to be divided evenly among three assembly lines (let's call them lines  $A$ ,  $B$ , and  $C$ ). (a) In how many ways can this be done? (b) Two of the wrenches are used and seven are new. What is the probability that line  $A$  gets both used wrenches?

**Problem 6** An assembly operation for a computer circuit board consists of four operations, which can be performed in any order. (a) In how many ways can the assembly operation be performed? (b) One of the operations involves soldering wire to a microchip. If all possible assembly orderings are equally likely, what is the probability that the soldering operation comes first or second?

**Problem 7** A package of six light bulbs contains two defective bulbs. If three bulbs are selected for use, find the probability that none of the three is defective.