Problem 1

For each of the following experiments, describe the sample space S

a) Picking 2 marbles, one at a time, from a bag that contains many yellow and green marbles

b) Getting two odd faces from rolling two dice

c) Count the proportion of defectives items in a shipment

d) Count the number of hail damaged spots on some car

Problem 2

Pick a card from the standard deck of 52 cards. Consider the following events:

A = {card has a Red Suit}

B = {card is a Heart}

C = {card is a Queen}

D = {card is a King}

Describe these events in terms of problem.

a) $A \backslash B$

b) $(B \cap A) \cup (A \cap B^c)$

c) $(C \cup D)^c$

d) $(A \cup B) \cap C$

e) $(C \cup D) \cap B$

Problem 3

Jane has 11 friends. She is planning to meet with some of her friends each day of a certain week, Thursday through Sunday (one friend per day).

a) How many possibilities are there for Jane's schedule for that week, if she is not willing to meet with the same friend more than once?

b) How many possibilities are there for Jane's schedule for that week, if she is willing to meet with the same friend more than once, but not twice in a row (or more)?

Problem 4

You have 7 rock music CDs, 5 indie music CDs, and 2 pop music CDs.

a) In how many ways can you arrange them?

b) In how many different ways can you arrange them so that the CDs of the same type are contiguous?

c) Suppose that you want to give your *rock music CDs* to your friends. You want to give 3 to Max, 2 to John, and 2 to Alice. In how many ways you can do that?

Problem 5

From a group of 9 biologists and 5 chemists, a group consisting of 3 biologists and 2 chemists is to be formed. In how many ways can this be done if

a) any biologist and any chemist can be included?

b) one particular chemist must be in the group?

c) three particular biologists cannot be in the group?

Problem 6

Use R statistical software (include your code) to make a well labeled plot $y = \left(1 + \frac{1}{n}\right)^n$.

Show on the plot that y approaches e for large n. This will illustrate that

$$\lim_{n \to \infty} \left(1 + \frac{1}{n}\right)^n = e$$

Bonus problem

You want to buy 7 cakes from a local bakery. The store has 4 types of cakes: chocolate, apple, cinnamon, and coconut cakes. How many different selections can you make? Note that cakes of the same type are considered indistinguishable.