1) Consider the experiment of flipping a fair coin once and rolling a fair four-sided die once. Let the event A={a head and an odd number occurred}

a) What is the sample space for this experiment?

b) What is the probability associated with each sample point?

c) What sample points make up the event A?

d) Use parts b and c to find P(A).

e) How could we use the multiplication rule to find P(A)?

2) Consider a lottery game where three numbers from 1 to 10 are chosen, independently and at random. In order to win, you have to get the three numbers exactly in order.

a) What is the probability that any single set of three numbers in order (chosen in advance) will be picked on a particular day?

b) What is the probability that the number 101 will be chosen on January 1st?

c) What is the probability that the number 101 will not be chosen on January 1st?

d) What is the probability that the number 101 will be chosen on January 1st and 102 will be chosen on January 2nd?

e) What is the probability that the number 101 would not be chosen on January 1st and 102 would not be chosen on January 2nd?

f) What is the probability that at least one of the following would occur: 101 is picked on January 1st, 102 is picked on January 2nd?

g) How many days during the year can be represented in the three digit form mdd (e.g. October 8 doesn't work because it would have two month digits and only one day digit, and there is no month 0).

h) What is the chance that none of these days would have "their number" chosen on them?

i) What is the chance that at least one of these days would have "its number" chosen on it?

3) One way of explaining part of the game show "Let's Make a Deal" is as follows. There are three doors. Behind one door is a prize that you would actually like to win. Behind the other two doors are farm animals that you don't even get to take home if you win them. The host (Monty) knows what is behind each door. The contestant (you) doesn't. The game proceeds as follows:

i) You are dressed in some goofy costume, and Monty chooses you to play.

ii) The real prize is randomly placed behind one of the three doors, and Monty knows which one.

iii) You randomly choose one of the doors.

iv) Monty doesn't show you what's behind the door you chose. From among the doors that are left that don't have the real prize behind them, Monty randomly chooses one and opens it. This leaves two closed doors (one with the prize behind it and one with a fake prize), and one open door with a fake prize. <u>He never opens the door that has the prize behind it.</u>

v) You either choose to stay with the door you picked originally, or you switch to the other closed door.

vi) Monty shows you what is behind the door, and you either win or lose.

The question is: Does it matter if you stay with the door you picked originally or if you switch to the other door? That is, do you have a better chance of winning if you stay with the door you picked originally, if you switch, or is it the same either way?

What does the obvious answer seem to be?

Now try answering it by making a tree-diagram. The first split is randomly choosing where the car is. The second split is you randomly guessing where the prize is. The third split is Monty randomly showing you one of the remaining doors that doesn't have the prize. What is the chance you would win if you stayed? What is the chance you would win if you switch? (It might be quicker to skip the first branch in the tree and assume he has put it behind a particular door).