Answers to the in class work sheet of 2/3/03

1a) {(H1), (H2), (H3), (H4), (T1), (T2), (T3), (T4) }
 b) 1/8
 c) {(H1), (H3) }
 d) Sample points are mutually exclusive, so 1/8+1/8= 2/8=1/4
     or could have done $P(H \cap odd) = P(H) P(Odd)$ because they are independent $= (1/2)(1/2) = 1/4$

2a) What is the probability of missing the next shot? $P(A^c)=1-P(A)=1-0.289=0.711$
b) What is the probability that the next two shots taken in a row will be missed? $(0.711)(0.711)=0.5055$
c) What is the probability that the next eighteen shots in a row will be missed? $(0.711)^{18}=0.0022$
d) What is the probability that they would make the next shot and then miss the 17 after that?
 $(0.289)(0.711)^{17}=0.0008764$
e) What is the probability that they would miss the next one, then make one, and then miss the 16 after that?
$(0.711)(0.289) (0.711)^{16}=0.0008764$
f) How many different ways are there to hit exactly one basket out of 18?   18
g) What is the probability of hitting exactly one out of 18 shots? $18(0.0008764)= 0.0158$
h) What is the probability of making one or fewer three-point shots out of 18? $0.0158+0.0022=0.0180$
i) What is the probability of making two or more three-point shots out of 18? $1-0.0180=0.9820$
j) What is the probability of making zero three-point shots out of 18 given that you have made one or fewer?
      $P(A|B)=P(A \cap B)/P(B)=0.0022/0.0180=0.1222$
       [Note the only way to have both zero and one or fewer is to have zero]
k) What is the probability of making zero three-point shots out of 18 given that you have made two or more? 0

3) The obvious "answer" is either to stay with the same door (why else would he try and make you switch?) or that it doesn't matter (one door has the prize and there are two left). The real answer is that it you are twice as likely to win if you switch!!   One way of verifying yourself is to play the game a bunch of times yourselves (or look at the results of other people playing) on one of the various web-sites that simulates it. Another way is to carefully make a tree diagram of the game. Part of the tree diagram is below. A + indicates a prize, a O indicates no prize, a circle around one of those symbols indicates the door you chose, and an S indicates the door that was shown to have no prize behind it.   The tree below is simplified by skipping the first branch of the tree (we left out the possibilities O+O OO+).