Answers to the in class probability worksheet of 9/11/01

1a) { (H1), (H2), (H3), (H4), (H5), (H6), (T1), (T2), (T3), (T4), (T5), (T6) }
 b) 1/12
 c) { (H1), (H3), (H5) }
 d) Sample points are mutually exclusive, so 1/12+1/12+1/12 = 3/12 = 1/4
 e) $P(H \cap \text{odd}) = P(H)\,P(\text{Odd})$ because they are independent $= (1/2)(3/6) = 3/12 = 1/4$

2a) We want the probability of the 1st getting a hole in one and the 2nd getting a hole in one. Assuming the golfers shots are independent we can use the multiplication rule and find that the probability is $({}^{1}/_{2,970})^2$
 b) $({}^{1}/_{2,970})^4$
 c) "First golfer misses" is the complement of "First golfer makes it", so: $1-{}^{1}/_{2,970} = {}^{2,969}/_{2,970}$
 d) $({}^{2,969}/_{2,970})^4$
 e) "At least one" is the complement of "None", so: $1-({}^{2,969}/_{2,970})^4$
 f) If we had been look especially at these four golfer's in a row, then the answer would definitely be no, it doesn't seem as if the chance of getting a hole in one is really ${}^{1}/_{2,970}$ for this hole. This is because the chance of seeing all four make a hole in one like this would be $({}^{1}/_{2,970})^4 \approx 1.285210\text{e-}14$. Thus, we either would have observed one of the rarest events that could occur, or we had the percent wrong for that hole. The latter seems more likely, doesn't it?

For the problem that this is based on (3.55 in the text), we actually cheated a bit though. That problem didn't pick out the four golfers before they hit... in fact they are only payed attention to because we know they hit the hole-in-ones. Even more, the players that made it weren't shooting back to back. The probability we should be looking for then is something like "the probability that sometime in the history of all golf tournaments that four players would make a hole in one on the same hole at some time during the tournament." This seems a bit more likely.

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+).