Practice for Second Quiz – CS 237 – Fall 2015

[This is a sample quiz very similar in form to what you will do in class 10/20.]

[I will hand out the summary of distributions (without graphs) for you to use at the quiz.]

You must do 3 of the following four problems for full credit. You have 30 minutes. Please cross out the one you are not doing. You must show all work: if you guess or just give your intuition, then my grade will be a (pessimistic) guess about how much you know! The problems are designed to be easy to compute, so you must give quantitative answers except for problem 2; fractions are fine!

Problem One. Let $X$ = the number of Spades among two cards drawn with replacement from a standard deck of playing cards. Give Range$(X)$, $p_X$, $E(X)$, and $\text{Var}(X)$.

Problem Two. Simultaneously and independently, each of $N$ people make a single toss of a (biased) coin with probability $p$ of a head. What is the probability of an “odd man out”--that is, $N$-1 people get one outcome and 1 person gets a different outcome? Just give the formula that calculates this probability.
**Problem Three.** John wants to breed guinea pigs but can’t tell the difference between males and females. His plan is to buy a number of them, put them together, and hope that he gets at least one male and one female, who will then breed. Assuming the probability of any particular pig being a female is 50%, how many guinea pigs does he have to buy to have at least a 75% chance of breeding the pigs?

**Problem Four.** Suppose you have 2 red balls and 2 black balls in an urn. You select 3 balls *without replacement*. What is the probability that you get 2 red balls and 1 black ball?