STAT 400 Discussion 3

1. Your friend Justin claims that he is an MLG and wants to 1v1 you at checkers where you always play first. Let's assume that you know you only have a chance of winning any given game equal to .43
   (a) If you play 5 games, what is the probability that you have more wins than Justin?
   (b) After the previous 5 warm up games, Justin wants to play a best of 5. What is the probability that he defeats you in the best of 5 series on the 5th game.

2. We would like to review some properties of expectation and variance. Let X be a discrete random variable with expected value 4 and variance 3. Also, let Y be an R.V. with expectation 2 and variance 1. Find the following
   (a) $E(2X + 1)$
   (b) $E(3X - 1 - 2Y + 2)$
   (c) $Var(X + 15)$
   (d) $Var(5X - 2)$
   (e) Assume that we have some function of our random variable X, call it g(X). Using the definition, write out the both the expectation variance for g(X).

3. You find an urn which contains N white and M black balls. You randomly select balls one at a time until you get a black one. If we assume sampling with replacement, what is the probability it takes at least k draws?

4. Lets assume you find a second similar urn with 100 total balls of many different colors, where 20 of them are cyan. If you draw 30 balls from the urn what is the probability that you select half of the cyan balls?