Assignment #2 — Due Friday, September 22, by 4pm

1. A certain circuit board consists of two resistors, green and red. The circuit board manufacturer has two huge bins filled with the resistors, one for each color. Based on several years of data, it is known that 90% of the red resistors are functional, and 75% of the green resistors are functional. When creating a circuit board, the technician selects one red and one green resistor at random. **Hints for the two problems below: It may help to write out the list of all possible outcomes of this random process. Also, remember that the probabilities of outcomes add, and that independent probabilities multiply.**

   (a) The circuit board as a whole is only functional if both resistors are functional. What is the probability that the circuit board is functional?

   (b) What is the probability that EXACTLY one of the resistors chosen is functional?

2. A nefarious gambler has developed a weighted six-sided die, with sides marked 1,2,3,4,5, and 6. The probability that a 6 is rolled is 0.4, and all the other sides are equally likely. Define the random variable $X =$ the value on the die when it is rolled once.

   (a) Write out the pmf of X.

   (b) Compute the probability that an even number is rolled.

   (c) Compute the expectation and variance of X.

3. For each of the following questions, say whether the random process is a binomial process or not, and explain your answer. As part of your explanation, you will want to comment on the potential validity of each of the four things that must be true for a process to be a binomial process.

   (a) One basketball player attempts 10 free throws and the number of successful attempts is totalled.

   (b) Ten different basketball players each attempt 1 free throw and the total number of successful attempts is totalled.

4. Let $B \sim Bin(20, 0.2)$. Compute the following probabilities. I would suggest computing these with a hand calculator using the formula provided in class (you will not have R on the exams!), but you can check your answers using R if you wish.

   (a) $P(B = 4)$.

   (b) $P(B \leq 1)$.

   (c) $P(B > 1)$.