AMAT 362—Work Sheet 11

Dr. Justin M. Curry

Due: March 9th, 2022. Worth 16 points.

Name: _____

1. (1 point) What is the expected number of sixes appear on 3 die rolls? What is the expected number of odd numbers?

2. (1 point) Let X be the number of spaces in 7 cards dealt from a well shuffled standard 52 card deck. What is $E(X)$?

3. (6 points) A fair six-sided die is rolled 2 times. Let L denote the number of times a value strictly less than 4 is rolled. Let M denote the number of times a 4 is rolled. Let H denote the number of times a 5 or 6 is rolled.

   (a) (2 points) Write down the joint PMF for (L, M, H).

   (b) (2 points) What is the distribution for L? Write out the PMF for L.

   (c) (2 points) What is the distribution for $L + H$?

4. (1 point) Suppose $E(X^2) = 3$, $E(Y^2) = 4$, $E(XY) = 2$. Find $E((X + Y)^2)$.

5. (2 points) In a circuit containing n switches, the i^{th} switch is closed with probability p_i. Let X denote the total number of switches that are closed. What is $E(X)$?

6. (5 points) There are 100 prize tickets among 1000 tickets in a lottery.
   (a) (1 point) What is the expected number of prize tickets you will get if you buy 3 tickets?

   (b) (2 points) What is a simple upper bound for the probability that you will win at least one prize?

   (c) (2 points) Calculate the actual probability. Why is this answer so close to the actual answer?