STAT22000 Summer 2020 Homework 5

All page, section, and exercise numbers below refer to the course text (*OpenIntro Statistics*, **3rd edition**, by Diez, Barr, and Cetinkaya-Rundel.).

Reading: Section 2.1, 2.2
Problems for Self-Study : (Do Not Turn In)

- Exercise 2.1, 2.3, 2.5, 2.7, 2.13, 2.15, 2.17, 2.21, 2.25 on p.116-122. Answers can be found at the end of the book (p.405-410).

Problems to Turn In: due **midnight** on **Sunday, July 5, on Gradescope**.

1. Suppose in a certain state, 60% of the people have a Visa credit card, 40% have a MasterCard, and 24% have both. Let V be the event that a randomly selected individual has a Visa credit card, and M be the analogous event for a MasterCard. So $P(V) = 0.60$, $P(M) = 0.40$, and $P(V \text{ and } M) = 0.24$.

   Please **show your work** to get full credit for all the parts below. *Hint: Draw a Venn Diagram.*

   (a) What is the probability that the randomly selected individual has at least one of the two types of cards?

   (b) What is the probability that the randomly selected individual has neither type of credit card?

   (c) What is the probability that the randomly selected individual has a MasterCard but no Visa credit card?

   (d) If the randomly selected individual is known to have a MasterCard, what is probability that he/she also owns a Visa card?

   (e) If the randomly selected individual is known to have no MasterCard, what is probability that he/she owns a Visa card?

   (f) Are the events V and M independent? Explain briefly.

   (g) Are the events V^c and M^c disjoint? Explain briefly.

2. A 6-face die is rolled 4 times. The six faces of the die have 1, 2, 3, 4, 5, 6 spots respectively. The die is fair meaning that all six faces are equally likely to come up. Find the probability of the following outcomes:

   (a) All 4 rolls show 3 or more spots

   (b) None of the 4 rolls show 3 or more spots. That is, all 4 rolls show 1 or 2 spots.

   (c) Six-spot comes up at least once in 4 rolls

   Please **show your work** to get full credit.

3. Five cards are drawn at random without replacement from a well-shuffled deck of poker cards

   (a) Find the probability that the 5th card is a queen, given that the first 4 cards are 3 Kings and a Queen.

   (b) Find the probability that the first 3 cards are Kings and the next two cards are the Queens. You may leave the answer as a product of fractions.