## Name:

## Fall 2019 Stat 311 Exam 1

**Instructions:** WRITE YOUR NAME CLEARLY. Do as many problems as you can for a maximal score of 100. SHOW YOUR WORK!

1. In how many ways can 4 boys and 3 girls be seated in a row, if all the boys must sit together? (for example, the arrangement gbbbbgg is allowed, but bggbbg is not). [10 pts]

3 separate awards (fastest cyclist, fastest swimmer, and fastest runner) are presented to a group of 10 contestants. How many outcomes are possible if each contestant can receive any number of awards?

From a group of 8 women and 6 men, a committee consisting of 3 men and 3 women is to be formed. How many different committees are possible if 2 men refuse to serve together and 2 women will only serve if they are together. [10 pts]

4. There are 5 couriers and 10 (identical) packages. In how many ways can they divide the packages among themselves? Be careful! El Chapo doesn't like mistakes! [10 pts]

5. If it is assumed that all  $\binom{52}{5}$  poker hands are equally likely, what is the probability of being dealt 2 pairs? (This occurs when the cards have denominations a, a, b, b, c, and a, b, c are all distinct).

[10 pts]

6. 9 fair dice are rolled. What is the probability of getting 3 pairs and one triple? (This occurs when the dice have denominations a, a,b, b, c, c, d, d, d, where a, b, c, and d are all distinct) [10 pts]

A pair of dice is rolled until a sum of either 5 or 7 appears. Find the probability that a 5 occurs first
[10 pts]

Suppose that A and B are mutually exclusive events for which P(A) = 0.3 and P(B) = 0.3. What is the probability that A occurs but B does not?
[10 pts]

9. A total of 28 percent of American males smoke cigarettes, 7 percent smoke cigars, and 5 percent smoke both cigars and cigarettes. What percentage smokes cigars but not cigarettes? [10 pts]

10.Consider a group of 10 people. If everyone shakes hands with everyone else, how many<br/>handshakes take place?[10 pts]

## **Extra Credit**

11. 6 children want to ride on a merry-go-round (a carousel). How many ways are there to sit them if 3 of them are friends and will only sit next to each other? [10 pts]

12. Give a combinatorial argument for the identity  $k \binom{n}{k} = n \binom{n-1}{k-1}$  [10 pts]