Statistics 134 - Instructor: Hank Ibser

MIDTERM

FRIDAY, OCTOBER 6, 2017

PRINT YOUR NAME _____

SIGN YOUR NAME _____

CIRCLE YOUR SECTION TIME:

9-10 1-2 2-3 3-4 4-5 5-6 6-7

CIRCLE YOUR GSI'S NAME:

Jason Zhang Andy Palaniappan Maxwell Weinstein

Kazu Kogachi Brian Thorsten Biyonka Liang Dibya Ghosh

Jessica Gao Dhruvil Badani Dhrushil Badani

TURN OFF YOUR CELL PHONE!
You may not use a calculator or any notes or books.
For full credit, give reasons and/or show work.
Each part of every problem is worth 10 points, for a total of 80.
Normal approximation answers should be left in terms of Φ, the normal cdf.
Answers need not be simplified, but any infinite sums should be.
You may use the backs of sheets as scratch, but write anything you want graded on the front.
Distribution summaries are on the last page, you need not hand this page in.
The exam will be collected at 1pm. When I call time, close your exam and stand up.
If you continue to work after I call time, I will give you a 0 on that problem.
GOOD LUCK!

Scores:

1:_____

2:_____

3:_____

Total:_____

1. You have a bag that contains 6 yellow skittles, 4 red skittles, and 5 purple skittles. You eat them randomly one-by-one. You eat a purple one and don't like it very much, but you keep eating. Once you eat a second purple one, you stop.

   (a) What is the chance that you eat exactly 7 skittles?

   (b) What is the expected number of skittles that you eat?

   (c) What is the variance of the number of skittles that you eat?

2. In the game of "BEARS" two basketball players take turns attempting free throws. In one round, each player attempts a free throw. If one player makes the free throw and the other doesn't, the player that makes it scores a point. If both make it or neither makes it, no one scores a point. First player to 5 points wins. Suppose Stephen has chance p_1 of making a free throw and Kevin has chance p_2, and all free throws are independent.

   (a) What is the chance that Stephen gets to 5 points first? (Answer should be in terms of p_1 and p_2. The answer may be given as a sum.)

   (b) Describe the distribution of the number of total points scored. (Name it and give parameter(s), give distribution table, or write a formula.)

   (c) Suppose Stephen and Kevin each shoot free throws until they each miss one. Let X be the number of free throws that Stephen shoots, and Y is the number that Kevin shoots. In terms of p_1 and p_2, what is the chance that $X > Y$?

3. Suppose that in a group of dogs, the average age is 2 years.

   (a) i. What is the greatest possible proportion of the dogs that is older than 7 years?

   ii. Suppose that the SD of the ages of the dogs is 2 years. Now what is the greatest possible proportion of the dogs that is older than 7 years?

   (b) Suppose we take the average of the ages of 64 random dogs. Approximately what is the chance that the average is more than 2.5 years?