

Homework Assignment 9

Due on Wednesday April 28th by midnight via Canvas

SDS 321 Intro to Probability and Statistics

1 Questions

1. (3+1+3+1 pts) If X, Y are independent and identically distributed random variables having uniform distributions over $[0, 1]$. Let $Z = \max(2X, Y)$ and $U = \min(X, Y)$.
 - (a) Find $f_Z(z)$
 - (b) Find $E[Z]$
 - (c) Find $f_U(u)$
 - (d) Find $E[U]$
2. (4 pts) Ten hunters are waiting for ducks to fly by. When a flock of ducks flies overhead, the hunters fire at the same time, but each chooses his target at random, independently of the others. If each hunter independently hits his target with probability .6, compute the expected number of ducks that are hit, given that the number of ducks flying at that time is k .
3. (2+2+2+2 = 8pts) From past experience, a professor knows that the test score of a student taking her final examination is a random variable with mean 75.
 - (a) Give an upper bound for the probability that a student's test score will exceed 85.
 - (b) Suppose, in addition, that the professor knows that the variance of a student's test score is equal to 25.
 - i. What can be said about the probability that a student will score between 65 and 85?
 - ii. How many students would have to take the examination to ensure, with probability at least .9, that the class average would be within 5 of 75? Do not use the central limit theorem.
 - iii. Now calculate the last part with the central limit theorem.