

Homework 10

Sections 5.4 - 5.7

STAT 5700 - Probability

Instructions

- Homework problems come from the 7th edition of the text *Mathematical Statistics with Applications* by Wackerly, Mendenhall, and Scheaffer, as well as (potential) additional problems provided by the instructor.
- You are responsible for understanding the concepts covered in all problems listed in a homework assignment, but only even-numbered problems should be turned in.
- Be NEAT and show work to support your answers. Points will be deducted if your answer is not adequately supported or the work cannot be readily followed.
- You are encouraged to work together on homework assignments, but each person must write up and turn in their own work and solutions.
- You will turn in this assignment by scanning your work and uploading a single pdf to Blackboard.
- Note there is a corresponding R Lab (Lab 10) that will be due at the same time as this assignment (HW 10).

Problems to do (responsible for content, but not collected/graded)

- Section 5.4: 45, 49, 53, 63
- Section 5.6: 77, 81, 87
- Section 5.7: 89, 93, 95

Problems to submit

- Section 5.4: 48, 52, 60, 64
 - Section 5.6: 76, 80
 - Section 5.7: 92, 94
 - Additional Problems below:
1. Let X and Y be independent random variables with $\mu_X = 1$, $\sigma_X = 10$, $\mu_Y = 2$, and $\sigma_Y = 4$. Compute the mean and the standard deviation for:
 - a. $X + Y$
 - b. $X - Y$
 - c. $X + 4Y$
 - d. $2X - 5Y$
 2. Let X and Y be random variables such that $V(X) = 5$, $V(Y) = 4$, and $Cov(X, Y) = -2$. Find

- a. $Cov(X + Y, X - Y)$
 - b. $Cov(X - Y, -2X + 5Y)$
 - c. $Corr(X - Y, -2X + 5Y)$
3. The correlation between X and Y is given by ρ_{XY} . Assume that $\rho_{XY} \neq 0$. A linear transformation is performed on X , and this linearly transformed variable is called W , where $W = bX$ and b is a positive constant. Show that $\rho_{WY} = \rho_{XY}$.