

STA 504 Homework #9

Due: Tuesday, November 14

Problem 1.

Let Y_1 and Y_2 be continuous random variables with pdf:

$$f_{Y_1 Y_2}(y_1, y_2) = \begin{cases} \frac{3y_1^2}{4}, & \text{if } 0 \leq y_1 \leq y_2 \leq 2. \\ 0, & \text{otherwise.} \end{cases}$$

- (a) Compute the expectation of Y_2 .
- (b) What is the expectation of $Y_1 \times Y_2$
- (c). Find the correlation coefficient of Y_1 and Y_2
- (d). Are Y_1 and Y_2 independent?

Problem 2.

A machine fills potato chip bag. Although each bag should weigh 50 grams each and contain 5 milligrams of salt, in fact, because of differing machines, weight and amount of salt placed in each bag varies. Bivariate density function for this machine is

$$f_{Y_1 Y_2}(y_1, y_2) = \begin{cases} \frac{1}{12}, & \text{if } 49 \leq y_1 \leq 51, 2 \leq y_2 \leq 8. \\ 0, & \text{otherwise.} \end{cases}$$

- (a) Compute the variance of Y_1 and Y_2 respectively.
- (b) What is the expectation of $Y_1 - Y_2$
- (c). Find the covariance of Y_1 and Y_2
- (d). Are Y_1 and Y_2 independent?