STA 504 Homework #9

Due: Monday, November 14

Problem 1.

Let Y_1 and Y_2 be continuous random variables with pdf:

$$f_{Y_1Y_2}(y_1, y_2) = \begin{cases} \frac{3y_1^2}{4}, & \text{if } 0 \le y_1 \le y_2 \le 2. \\ 0, & \text{otherwise.} \end{cases}$$

(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

$$f_{Y_1Y_2}(y_1, y_2) = \begin{cases} \frac{1}{12}, & \text{if } 49 \le y_1 \le 51, 2 \le y_2 \le 8. \\ 0, & \text{otherwise.} \end{cases}$$

(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?