Print then work on it directly. Staple HW 9-1 and 9-2 together.

Problem 1

4.146 A manufacturer of tires wants to advertise a mileage interval that excludes no more than 10% of the mileage on tires he sells. All he knows is that, for a large number of tires tested, the mean mileage was 25,000 miles, and the standard deviation was 4000 miles. What interval would you suggest?

Problem 2

5.2 Three balanced coins are tossed independently. One of the variables of interest is Y_1, the number of heads. Let Y_2 denote the amount of money won on a side bet in the following manner. If the first head occurs on the first toss, you win \$1. If the first head occurs on toss 2 or on toss 3 you win \$2 or \$3, respectively. If no heads appear, you lose \$1 (that is, win $-\$1$).

a Find the joint probability function for Y_1 and Y_2.

b What is the probability that fewer than three heads will occur and you will win \$1 or less? [That is, find $F(2, 1)$.]

Problem 3

5.5 Refer to Example 5.4. The joint density of Y_1, the proportion of the capacity of the tank that is stocked at the beginning of the week, and Y_2, the proportion of the capacity sold during the week, is given by

$$f(y_1, y_2) = \begin{cases} 3y_1, & 0 \le y_2 \le y_1 \le 1, \\ 0, & \text{elsewhere.} \end{cases}$$

    a Find $F(1/2, 1/3) = P(Y_1 \le 1/2, Y_2 \le 1/3)$.

    b Find $P(Y_2 \le Y_1/2)$, the probability that the amount sold is less than half the amount purchased.

Ignore the words "Refer to Example 5.4"

Problem 4

5.6 Refer to Example 5.3. If a radioactive particle is randomly located in a square of unit length, a reasonable model for the joint density function for Y_1 and Y_2 is

$$f(y_1, y_2) = \begin{cases} 1, & 0 \le y_1 \le 1, 0 \le y_2 \le 1, \\ 0, & \text{elsewhere.} \end{cases}$$

a What is $P(Y_1 - Y_2 > .5)$?
b What is $P(Y_1 Y_2 < .5)$?

Ignore the words "Refer to Example 5.3"

Problem 5

5.8 Let Y_1 and Y_2 have the joint probability density function given by

$$f(y_1, y_2) = \begin{cases} ky_1y_2, & 0 \le y_1 \le 1, 0 \le y_2 \le 1, \\ 0, & \text{elsewhere.} \end{cases}$$

a Find the value of k that makes this a probability density function.

b Find the joint distribution function for Y_1 and Y_2.

c Find $P(Y_1 \le 1/2, Y_2 \le 3/4)$.

Problem 6

5.14 Suppose that the random variables Y_1 and Y_2 have joint probability density function $f(y_1, y_2)$ given by

$$f(y_1, y_2) = \begin{cases} 6y_1^2 y_2, & 0 \le y_1 \le y_2, \ y_1 + y_2 \le 2, \\ 0, & \text{elsewhere.} \end{cases}$$

a   Verify that this is a valid joint density function.

b   What is the probability that $Y_1 + Y_2$ is less than 1?