EE 503

Homework 7

Due Wednesday October 16, 2019 at 6 p.m.

Work all 4 problems.

Problem 1. Find the density of $Y = \sin^{-1}(X)$ when

a. X is uniform on [0,1].

b. X is uniform on [-1,1].

Problem 2. Let $p_{ik} = P(X = i\ Y = k)$. You are given the following joint probability distribution of the discrete random variable $(X,\ Y)$: $p_{11} = 1/12$, $p_{12} = 0$, $p_{13} = 1/18$, $p_{21} = 1/6$, $p_{22} = 1/9$, $p_{23} = 1/4$, $p_{31} = 0$, $p_{32} = 1/5$, $p_{33} = 2/15$. Find all marginal distributions.

Problem 3. Consider the joint density for random variables X and Y

$$f(x,y) = \begin{cases} x+y, & 0 < x < 1,\ 0 < y < 1 \\ 0, & \text{elsewhere.} \end{cases}$$

Determine if X and Y are independent.

Problem 4. Consider the joint density for random variables X and Y

$$f(x,y) = \begin{cases} C(x+2y), & 0 < x < 2,\ 0 < y < 1 \\ 0, & \text{elsewhere.} \end{cases}$$

a. Find the value of C.

b. Find the marginal density of X, $f_X(x)$.

c. Find the joint cdf of X and Y.

d. Find the pdf of the random variable $Z = 9/(X+1)^2$.