XX50215 Statistics for Data Science

Problems 5 - Solutions

1. A random point (X,Y) is distributed uniformly on the square with vertices (1,1), (1,-1), (-1, 1), (-1,-1). That is the joint pdf f(x,y) = 0.25 on the square. Determine the probabilities of the following events.

    a. $X^2 + Y^2 <= 1$
    b. $2X - Y > 0$
    c. $|X + Y| < 2$

2. I leave for work between 8AM and 8:30AM and takes between 40 and 50 minutes to get there. Assuming that departure time and journey length are independent and each is uniformly distributed what is the probability that I will arrive before 9AM?

3. If a stick is broken at random into three pieces, what is the probability that the pieces can be put together in a triangle?

4. Suppose that the random variable Y has a binomial distribution with n trials and success probability X, where n is a constant and X is a uniform(0,1) random variable. Find EY and Var Y.

5. Show that any random variable is uncorrelated with a constant.

6. How many terms are in the expansion of $(x_1 + x_2 + x_3)^4$?