Course: STAT-319
Term: 181
Homework # 3
Material: Chapter 4 excluding sections 4.6, 4.7 & 4.11
Due Date: Tuesday, 09-October-2018

Q1: If the probability density of a random variable is given by

$$f(x) = \begin{cases} k(1-x^2) & \text{for } 0 < x < 1 \\ 0 & \text{elsewhere} \end{cases}$$

Find the value of k and the probabilities that a random variable having this probability density will take on a value

a) between 0.1 and 0.2;
b) greater than 0.5.
c) Find μ and σ^2.

Q2: With reference to Q1, find the corresponding distribution function and use it to determine the probabilities that a random variable having this distribution function will take on a value

a) less than 0.3;
b) between 0.4 and 0.6.

Q3: In certain experiments, the error made in determining the density of a silicon compound is a random variable having the probability density

$$f(x) = \begin{cases} 25 & \text{for } -0.02 < x < 0.02 \\ 0 & \text{elsewhere} \end{cases}$$

Find the probabilities that such an error will be

a) between −0.03 and 0.04;
b) between −0.005 and 0.005.

Q4: A software engineer models the crashes encountered when executing a new software as a random variable having the Weibull distribution with $\beta = 0.6$ and $\delta = 20$. What is the probability that the software crashes after 6 minutes?

Q5: The server of a multinational corporate network can run for an amount of time without having to be rebooted and this amount of time is a random variable having the exponential distribution with an average of 30 days. Find the probabilities that such a server will

a) have to be rebooted in less than 10 days;
b) not have to be rebooted in at least 45 days.

Q6: A consulting engineer receives, on average, 0.7 requests per week. If the number of requests follows a Poisson process, find the probabilities that the time between successive requests for consulting will be

a) less than 0.5 week;
b) more than 3 weeks.