**CS660**
**Homework 5**

Read chapter 6 then complete **ALL TEN** of the following problems. Please upload your assignment as ONE PDF. Please do not submit multiple JPG files, HEIC, or GoogleDoc.

1. Chapter 6 Exercises #6.1 (Complete the textbook problem)

2. Chapter 6 Exercise #6.3 (Complete the textbook problem)

3. Chapter 6 Exercise #6.4 (Complete the textbook problem)

4. Chapter 6 Exercise #6.11 (Complete the textbook problem)

5. Chapter 6 Exercise #6.13 (Complete the textbook problem)

6. From experience, a stockbroker believes that under present economic conditions a customer will invest in tax-free bonds with a probability of 0.6, will invest in mutual funds with a probability of 0.3, and will invest in both tax-free bonds and mutual funds with a probability of 0.15. Find the probability that a customer will invest
(a) in either tax-free bonds or mutual funds (b) in neither tax-free bonds nor mutual funds

7. A truth serum has the property that 90% of the guilty suspects are properly judged while, 10% of the guilty suspects are improperly found innocent. On the other hand, innocent suspects are misjudged 1% of the time. If the suspect was selected from a group of suspects of which only 5% have ever committed a crime, and the serum indicates that he is guilty, what is the probability that he is innocent? (Hint: Bayes)

8. If a dealer's profit, in units of $5,000, on a new automobile is a random variable X having the density function $f(x) = 2(1 - x)$, $0 < x < 1$, zero elsewhere, find the average profit per automobile.

9. If the proportion of a brand of television set requiring service during the first year of operation is a random variable having a beta distribution with $\alpha = 3$ and $\beta = 2$, what is the probability that at least 80% of the new models of this brand sold this year will require service during their first year of operation?

10. Service calls come to a maintenance center according to a Poisson process with $\lambda$ calls per minute. A data set of 20 one-minute periods yields an average of 1.8 calls. If the prior for $\lambda$ is an exponential distribution with mean 2, determine the posterior distribution of $\lambda$.