Assignment One – Chapter One (Six problems)

Due: 1/23

1.

Ace Machine Works estimates that the probability its lathe tool is properly adjusted is 0.87. When the lathe is properly adjusted, there is a 0.95 probability that the parts produced pass inspection. If the lathe is out of adjustment, however, the probability of a good part being produced is only 0.35. A part randomly chosen is inspected and found to be acceptable. At this point, what is the posterior probability that the lathe tool is not properly adjusted?

2.

Gary Schwarts is the top salesman for his company. Records indicate that he makes a sale on 60% of his sales calls. If he calls on eight potential clients, what is the probability that he makes exactly 3 sales? What is the probability that he makes exactly 5 sales?

3.

If 12% of all disk drives produced on an assembly line are defective, what is the probability that there will be exactly two defects in a random sample of 24 of these? What is the probability that there will be one defect in a random sample of 24? What is the probability that there will be less than seven defects in a random sample of 24?

4.

An industrial oven used to cure sand cores for a factory manufacturing engine blocks for small cars is able to maintain fairly constant temperatures. The temperature range of the oven follows a normal distribution with a mean of 430^{o}F and a standard deviation of 25^{o}F. Leslie Larsen, president of the factory, is concerned about the large number of defective cores that have been produced in the past several months. If the oven gets hotter than 451^{o}F the core is defective. What is the probability that the oven will cause a core to be defective? What is the probability that the temperature of the oven will range from 440^{o}F to 458^{o}F?

5.

Armstrong Faber produces a standard number-two pencil called Ultra-Lite. Since Chuck Armstrong started Armstrong Faber, sales have grown steadily. With the increase in the price of wood products, however, Chuck has been forced to increase the price of the Ultra-Lite pencils. As a result, the demand for Ultra-Lite has been fairly stable over the past 6 years. On the average, Armstrong Faber has sold 515,000 pencils each year. Furthermore, 95% of the time sales have been between 475,000 and 555,000 pencils. It is expected that the sales follow a normal distribution with a mean of 515,000 pencils. Estimate the standard deviation of this distribution.

6.

A new integrated computer system is to be installed worldwide for a major corporation. Bids on this project are being solicited, and the contract will be awarded to one of the bidders. As a part of the proposal for this project, bidders must specify how long the project will take. There will be a significant penalty for finishing late. One potential contractor determines that the average time complete a project of this type is 32 weeks with a standard deviation of 7 weeks. The time required to complete this project is assumed to be normally distributed.

(a) If the due date of this project is set at 43 weeks, what is the probability that the contractor will have to pay a penalty (i.e., the project will not be finished on Schedule)?
(b) If the due date of this project is set at 24 weeks, what is the probability that the contractor will have to pay a penalty (i.e., the project will not be finished on schedule)?
(c) If the bidder wishes to set the due date in the proposal so that there is only a 5% chance of being late (and consequently only a 5% chance of having to pay a penalty), what due date should be set?