**All questions are required and have equal weight.**

**1. (a) What is the difference between a sample and a population? Give one real world example for a sample and one real world example for a population.**

**(b) What is the Central Limit Theorem? Why is it important in statistical data analysis? How is the rule of thumb used for the application of the Central Limit Theorem?**

**(c) What is coefficient of correlation? What values can it take? What is the interpretation of these values?**

**(d) What do you understand from the terms: mutually exclusive events and collectively exhaustive events? Give examples to clarify the differences in these two terms.**

**2. Given the following set of data from a sample of size n = 7,**

**7 7 5 8 4 5 6**

**(a) Compute the mean, median, and mode.**

**(b) Compute the variance, standard deviation, and coefficient of variation.**

**(c) Compute the five-number summary and describe the shape of the boxplot.**

**3. The employees of a large company were surveyed on questions regarding their educational background and gender. Out of a total of 400 women employees, 240 had college degrees. Out of a total of 400 men employees, 200 had college degrees.**

**(a) Set up a 2 X 2 contingency table to evaluate the probabilities.**

**(b) Give an example of a simple event.**

**(c) Give an example of a joint event.**

**(d) What is the complement of the event: a woman with a college degree?**

**If an employee is selected at random,**

**(e) What is the probability that the employee is a man?**

**(f) What is the probability that the employee has a college degree?**

**(g) What is the probability that the employee is a man and has a college degree?**

**(h) What is the probability that the employee is a man or has a college degree?**

**4. Given a Normal distribution with mean  = 2000 and  = 100,**

**(a) What is the probability that X > 1860?**

**(b) What is the probability that X < 2140?**

**(c) What is the probability that 1860 < X < 2140?**

**(d) 60% of the values are less than what X value?**

**5. A trucking company determined that, on an annual basis, the distance traveled per truck is normally distributed with a mean of 60 thousand miles and a population standard deviation of 16 thousand miles. If a sample of 16 trucks is selected,**

**(a) What is the probability that the average distance traveled is less than 58 thousand miles?**

**(b) What is the probability that the average distance traveled is more than 62 thousand miles?**

**(c) What is the probability that the average distance traveled is between 58 thousand miles and 62 thousand miles?**

**(d) Do we need the Central Limit Theorem to solve (a), (b), and (c)? Why or why not? Explain.**