Homework Assignment-5

POM 500 Statistical Analysis

Note: Attempt all questions as per rubric. Problems including case study has a weightage of 10 marks each. The maximum you can score is 50. Use Excel function wherever possible.

Problem-1

A simple random sample of 8 employees of a corporation provided the following information.

Employee	1	2	3	4	5	6	7	8
Age	25	32	26	40	50	54	22	23
Gender	M	M	M	M	F	M	M	F

a) Determine the point estimate for the average age of all employees. (Excel function)

b) What is the point estimate for the standard deviation of the population?

c) Determine a point estimate for the proportion of all employees who are female.

Problem-2

The mean annual cost of automobile insurance is $939. Assume that the standard deviation is $245.

a) What is the probability that a simple random sample of automobile insurance policies will have a sample mean within $25 of the population mean for each of the following sample sizes: 30, 50, 100, and 400? (Write Excel function)

b) What is the advantage of larger sample size when attempting to estimate the population means?

Problem-3

Students of a large university spend an average of $5 a day on lunch. The standard deviation of the expenditure is $3. A simple random sample of 36 students is taken.

a) What is the expected value, standard error, and shape of the sampling distribution of the sample mean?

b) What is the probability that the sample mean will be at least $4? (Excel function)

c) What is the probability that the sample mean will be at most $5.50? (Excel function)

Problem-4

In a large university, 20% of the students are business majors. A random sample of 100 students is selected, and their majors are recorded.

a) Compute the standard error of the proportion.

b) What is the probability that the sample contains at least 12 business majors? (Write Excel function)

c) What is the probability that the sample contains less than 15 business majors? (Write Excel function)

d) What is the probability that the sample contains between 12 and 14 business majors? (Write Excel function)

Case Study: Marion Dairies

Last year Marion Dairies decided to enter the yogurt market, and it began cautiously by producing, distributing, and marketing a single flavor—a blueberry-flavored yogurt that it calls Blugurt. The company's initial venture into the yogurt market has been very successful; sales of Blugurt are higher than expected, and consumers' ratings of the product have a mean of 80 and a standard deviation of 25 on a 100-point scale for which 100 is the most favorable score and zero is the least favorable score. Experience has also shown Marion Dairies that a consumer who rates one of its products with a score greater than 75 on this scale will consider purchasing the product, and a score of 75 or less indicates the consumer will not consider purchasing the product.

Emboldened by the success and popularity of its blueberry-flavored yogurt, Marion Dairies management is now considering the introduction of a second flavor. Marion's marketing department is pressing to extend the product line through the introduction of a strawberry-flavored yogurt that would be called Strawgurt, but senior managers are concerned about whether or not Strawgurt will increase Marion's market share by appealing to potential customers who do not like Blugurt. That is, the goal in offering the new product is to increase Marion's market share rather than cannibalize existing sales of Blugurt. The marketing department has proposed giving tastes of both Blugurt and Strawgurt to a simple random sample of 50 customers and asking each of them to rate the two flavors of yogurt on the 100-point scale. If the mean score given to Blugurt by this sample of consumers is 75 or less, Marion's senior management believes the sample can be used to assess whether Strawgurt will appeal to potential customers who do not like Blugurt.

Prepare a managerial report that addresses the following issues.

a) Calculate the probability the mean score of Blugurt given by the simple random sample of Marion Dairies customers will be 75 or less.

b) If the Marketing Department increases the sample size to 150, what is the probability the mean score of Blugurt given by the simple random sample of Marion Dairies customers will be 75 or less?

c) Explain to Marion Dairies senior management why the probability that the mean score of Blugurt for a random sample of Marion Dairies customers will be 75 or less is different for samples of 50 and 150 Marion Dairies customers.