Assignment 1 : MA4240

Q 1. A hospital introduces a new screening technique to identify patients who are suffering from a heart disease so that a new drug can be given during the critical period of 10 hours after an attack. The technique seems to be successful as in the first six months of its implementation, the rate of recovery is higher in comparison to that in the previous six months for patients admitted to the hospital.

(i) Identify the explanatory and confounding variable(s).

(ii) How the confounding may invalidate the conclusions of the study?

(iii) Suggest how you would change the study to eliminate the effect of the confounding variable.

Q. 2 An auto parts supplier with distribution centers across Telengana wants to survey its employees regarding life insurance coverage. It is known that employee insurance plans vary greatly from city to city. The company is interested to obtain an estimate of the annual life insurance deductible its employees would find acceptable. What sampling plan would you suggest to the company to achieve its goal? Give justification.

Q. 3 In a healthy person, White Blood Cell (WBC) counts are approximately normally distributed with a mean of 7550 WBC/mm^3 and a standard deviation of 1085.

(i) Find the probability of patients having WBC counts exceeding 9000?

(ii) Given that the top 10% of WBC counts are abnormal, find the upper limit of normal?

Q. 4 An agency reports on the typical daily room rate at six luxury and nine budget hotels. The room rates are given in the following table.

Luxury Hotel	$175	$180	$120	$150	$120	$125			
Budget Hotel	$50	$50	$49	$45	$36	$45	$50	$50	$40

(i) Compute the mean and standard deviation of the room rates for both luxury and budget hotels.

(ii) Verify that luxury hotels have a more variable room rate than budget hotels.

(iii) Give a practical reason why the luxury hotels are more variable than the budget hotels.

(iv) Can you suggest any another measure of variability better to compare luxury and budget hotel rates? Explain.

Q. 5(a) The following data are the resting pulse rates for 30 randomly selected individuals who were participants at a race.

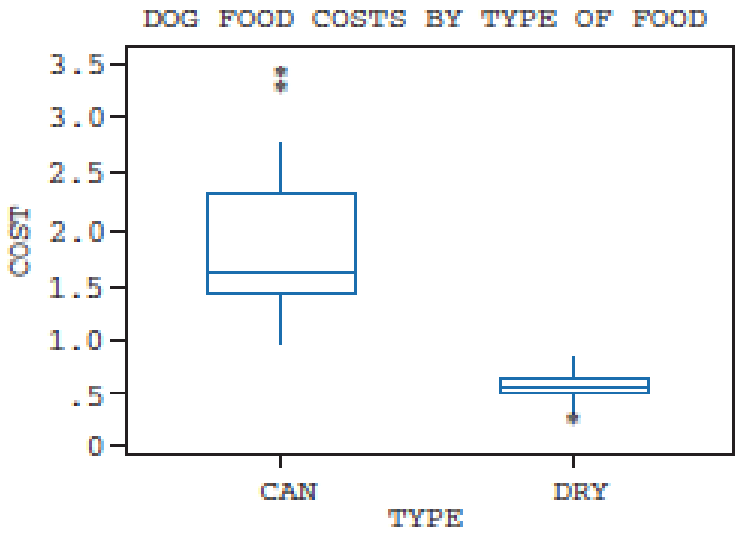
49 40 59 56 55 70 49 59 55 49 58 54 55 72 51

54 56 55 65 57 61 41 52 60 49 57 46 55 63 55

(i) Construct a boxplot of the pulse rates.

(ii) Describe the shape of the distribution of the pulse rates. Identify the outliers, if any.

Q. 5(b) Consumer Reports in its May 1998 issue provides cost per daily feeding for 28 brands of dry dog food and 23 brands of canned dog food. The following side-by-side boxplot for these data was created.



(i) From these graphs, determine the median, lower quartile, and upper quartile for the daily costs of both dry and canned dog food.

(ii) Comment on the similarities and differences in the distributions of daily costs for the two types of dog food.

Q 6. Based on the 1990 census, the number of hours per day adults spend watching television is approximately normally distributed with a mean of 5 hours and a standard deviation of 1.3 hours.

(i) What proportion of the population spends more than 7 hours per day watching television?

(ii) In a 1998 study of television viewing, a random sample of 500 adults reported that the average number of hours spent viewing television was greater than 5.5 hours, per day. Do the results of this survey appear to be consistent with the 1990 census?

Q. 7 The baggage limit for an airplane is set at 100 pounds per passenger. Thus, for an airplane with 200 passenger seats, there would be a limit of $20,000$ pounds. The weight of the baggage of an individual passenger is a random variable with a mean of 95 pounds and a standard deviation of 35 pounds. If all 200 seats are sold for a particular flight, what is the probability that the total weight of the passengers' baggage will exceed the $20,000$-pound limit?

Q. 8 Assume that a Ration Distribution Center has 10,000 sacks of rice. In this center, the average weight of a sack of rice is 80 pounds, with a standard deviation of 20 pounds. Suppose you draw a random sample of 50 sacks. What is the probability that the average weight of a sampled sack will be less than 75 pounds?

Q. 9 Suppose it is known that 43% of Indians own a Maruti Suzuki car. If a random sample of 50 Indians were surveyed, what is the probability that the proportion of the sample who owned a Maruti Suzuki is between 45% and 50%?