**Quantitative Methods – I**

**NMIMS Centre for Distance and Online Education (NCDOE)**

**Internal Assignment Applicable for June 2025 Examination**

**Q1. From a large batch of batteries, a sample of size 50 is drawn. The average lifespan of the batteries is 1200 hours with a standard deviation of 200 hours.**

**1. Find the probability that the mean lifespan of the sample is less than 1150 hours. (3 Marks)**

**2. Calculate the 95% confidence interval for the sample mean lifespan. (4 Marks)**

**3. Discuss the effect of increasing the sample size to 100 on the standard error and the probability calculation. (3 Marks)**

**(10 Marks)**

**Answer:**

**Introduction:**

Statistical analysis plays a critical role in decision-making across industries, particularly in manufacturing, quality control, and business strategy. One of the fundamental aspects of statistics is understanding how sample data represents a larger population, allowing businesses and researchers to make informed predictions. In this scenario, a batch of batteries is analyzed for their lifespan, and a random sample of 50 batteries is selected to estimate their average lifespan and variations. The given data specifies that the mean lifespan of batteries is 1200 hours, with a standard deviation of 200 hours.

**This is partially solved sample answer**

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**Q2A. A deck of cards contains 10 red and 6 black cards. If two cards are randomly drawn without replacement, what is the probability that both cards drawn are black?**

**What is the probability that at least one of the two cards drawn is red? (5 Marks)**

**Answer:**

**Introduction:**

Probability is a fundamental concept in mathematics that helps us determine the likelihood of various events occurring. When dealing with problems involving a deck of cards, we use probability rules to find the chances of drawing specific cards. In this case, we have a deck of 16 cards, with 10 red and 6 black cards. We need to calculate the probability of drawing two black cards and the probability of drawing at least one red card when selecting two cards without replacement. This problem involves the concepts of dependent probability, as the selection of the first card affects the second draw.

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**Q2B. A milling machine is set to produce rods that have an average length of 15.00 cm. The machine is known to have a standard deviation () of 0.3 cm. The customer specifies the rod length to be within 14.80 cm and 15.20 cm. What is the acceptance percentage given the setting and age of the machine (age determines the standard deviation)? (5 Marks)**

**Answer:**

**Introduction:**

A milling machine is used to produce rods of precise lengths, ensuring they meet customer specifications. Over time, as the machine ages, variations in production increase, making it important to understand the percentage of rods that fall within the acceptable range. In this case, the milling machine is set to produce rods with an average length of 15.00 cm and a standard deviation of 0.3 cm. The customer specifies that acceptable rod lengths must fall between 14.80 cm and 15.20 cm. By using statistical methods, we can determine the acceptance percentage and assess the machine’s efficiency in maintaining quality standards.

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