**CBA: Practice Problem Set 2**

**Topics: Sampling Distributions and Central Limit Theorem**

1. Examine the following normal Quantile plots carefully. Which of these plots indicates that the data …
2. Are nearly normal?

Ans. C

1. Have a bimodal distribution? (One way to recognize a bimodal shape is a “gap” in the spacing of adjacent data values.)

Ans. B

1. Are skewed (i.e. not symmetric) ?

Ans. A,C,D

1. Have outliers on both sides of the center?

Ans. A



1. For each of the following statements, indicate whether it is True/False. If false, explain why.

The manager of a warehouse monitors the volume of shipments made by the delivery team. The automated tracking system tracks every package as it moves through the facility. A sample of 25 packages is selected and weighed every day. Based on current contracts with customers, the weights should have *μ* = 22 lbs. and *σ* = 5 lbs.

1. Before using a normal model for the sampling distribution of the average package weights, the manager must confirm that weights of individual packages are normally distributed.

Answer: False. The statement is incorrect. The manager of a warehouse monitors the volume of shipments made by the delivery team. The automated tracking system tracks every package as it moves through the facility. A sample of 25 packages is selected and weighed every day. Based on current contracts with customers, the weights should have u= 22 lbs, and o = 5 lbs. However, before using a normal model for the sampling distribution of the average package weights, the manager must confirm that the weights of individual packages are normally distributed

1. The standard error of the daily average SE() = 1.

Answer: The statement is incomplete. The standard error of the daily average depends on the standard deviation of the population, the sample size, and the distribution of the population. Without knowing the sample size and the population distribution, we cannot determine the standard error of the daily average

1. Auditors at a small community bank randomly sample 100 withdrawal transactions made during the week at an ATM machine located near the bank’s main branch. Over the past 2 years, the average withdrawal amount has been $50 with a standard deviation of $40. Since audit investigations are typically expensive, the auditors decide to not initiate further investigations if the mean transaction amount of the sample is between $45 and $55. What is the probability that in any given week, there will be an investigation?
2. 1.25%
3. 2.5%
4. 10.55%
5. 21.1%
6. 50%

Answer: Option D

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1. The auditors from the above example would like to maintain the probability of investigation to 5%. Which of the following represents the minimum number transactions that they should sample if they do not want to change the thresholds of 45 and 55? Assume that the sample statistics remain unchanged.
2. 144
3. 150
4. 196
5. 250
6. Not enough information

To determine the minimum number of transactions that the auditors should sample while maintaining a probability of investigation at 5%, we need more information about the population size and the distribution of transactions. Unfortunately, the given information does not provide these details. Therefore, **the correct answer is E. Not enough information**.

1. An educational startup that helps MBA aspirants write their essays is targeting individuals who have taken GMAT in 2012 and have expressed interest in applying to FT top 20 b-schools. There are 40000 such individuals with an average GMAT score of 720 and a standard deviation of 120. The scores are distributed between 650 and 790 with a very long and thin tail towards the higher end resulting in substantial skewness. Which of the following is likely to be true for randomly chosen samples of aspirants?
2. The standard deviation of the scores within any sample will be 120.

This statement is likely false. While the population has a standard deviation of 120, the standard deviation within individual samples may vary. Random samples can have different compositions, including variations in the distribution of scores, which can result in different standard deviations within each sample.

1. The standard deviation of the mean of across several samples will be 120.

This statement is likely false. The standard deviation of the mean across several samples, also known as the standard error of the mean, decreases as the sample size increases. Therefore, the standard deviation of the mean across several samples is expected to be smaller than 120.

1. The mean score in any sample will be 720.

This statement is not necessarily true. While the average GMAT score of the population is 720, the mean score within each individual sample may vary. Random samples may contain aspirants with scores above or below the population average, resulting in different mean scores for each sample.

1. The average of the mean across several samples will be 720.

This statement is likely true. As the random samples are drawn from the population, the average of the mean across several samples is expected to be close to the population average of 720. This is a consequence of random sampling, which tends to provide representative samples from the population.

1. The standard deviation of the mean across several samples will be 0.60

This statement is likely false. The standard deviation of the mean across several samples, also known as the standard error of the mean, is influenced by the sample size. As the sample size increases, the standard deviation of the mean decreases, but it is unlikely to reach such a small value as 0.60. The standard deviation of the mean is typically smaller than the standard deviation of the population but still measures the variability in the means across samples.

**In summary, statement D is likely to be true for randomly chosen samples of MBA aspirants.**