Reading 7

ESTIMATION AND INFERENCE

1. **(C)** **can be applied to complex statistics.**

   Explanation

   Calculating the standard error of sample means based on a single sample variance is most appropriate when the sample is unbiased and the population is approximately normally distributed. When these conditions do not hold, the bootstrap method may be more appropriate. This method is more computationally demanding in that it requires the analyst to calculate the means of multiple samples from the full dataset.

   (Module 7.1, LOS 7.c)

2. **(B)** **The size of each sub-sample is selected to be the same across strata.**

   Explanation

   In stratified random sampling we first divide the population into subgroups, called strata, based on some classification scheme. Then we randomly select a sample from each stratum and pool the results.

   The size of the samples from each strata is based on the relative size of the strata relative to the population and are not necessarily the same across strata.

   (Module 7.1, LOS 7.a)

3. **(C)** **judgmental sampling.**

   Explanation

   Judgmental sampling refers to using expert or professional judgement to select observations from a population.

   (Module 7.1, LOS 7.a)

4. **(C)** **states that for a population with mean μ and variance σ^2, the sampling distribution of the sample means for any sample of size n will be approximately normally distributed.**

   Explanation

   This question is asking you to select the inaccurate statement. The CLT states that for a population with mean μ and a finite variance σ^2, the sampling distribution of the sample means becomes approximately normally distributed as the sample size becomes large. The other statements are accurate.

   (Module 7.1, LOS 7.b)

5. **(B) stratified random sampling.**

    Explanation

    In stratified random sampling we first divide the population into subgroups, called strata, based on some classification scheme. Then we randomly select a sample from each stratum and pool the results. The size of the samples from each strata is based on the relative size of the strata relative to the population. Simple random sampling is a method of selecting a sample in such a way that each item or person in the population being studied has the same (non-zero) likelihood of being included in the sample.

    (Module 7.1, LOS 7.a)

6. **(A) sample mean.**

    Explanation

    The central limit theorem tells us that for a population with a mean m and a finite variance σ^2, the sampling distribution of the sample means of all possible samples of size n will approach a normal distribution with a mean equal to μ and a variance equal to σ^2/n as n gets large.

    (Module 7.1, LOS 7.b)

7. **(A) 16.62.**

    Explanation

    According to the central limit theorem, the mean of the distribution of sample means will be equal to the population mean. n > 30 is only required for distributions of sample means to approach normal distribution.

    (Module 7.1, LOS 7.b)

8. **(C) stratified random sampling.**

    Explanation

    In stratified random sampling, a researcher classifies a population into smaller groups based on one or more characteristics, takes a simple random sample from each subgroup, and pools the results.

    A random sample is one where each member of the population has an equal chance of being selected.

    Systematic sampling is where every n*th* member of the population is selected, also known as non random sampling

    (Module 7.1, LOS 7.a)

9. **(B)** **corporate bonds.**

Explanation

Stratified sampling is most often used for bond portfolios.

(Module 7.1, LOS 7.a)

10. **(B)** **convenience sampling.**

Explanation

Convenience sampling refers to sampling an element of a population based on ease of access.

(Module 7.1, LOS 7.a)

11. **(A)** **approaches a normal distribution.**

Explanation

As n gets larger, the variance of the distribution of sample means is reduced, and the distribution of sample means approximates a normal distribution.

(Module 7.1, LOS 7.b)

12. **(C)** **Jackknife**

Explanation

The jackknife technique involves calculating the standard deviation of the means from samples, each of which is calculated with a different observation removed from the original sample. The bootstrap method involves drawing multiple random samples from adataset and calculating the standard deviation of those sample means. Standard error based on the standard deviation of a single sample is estimated by dividing the sample standard deviation by the square root of the sample size.

(Module 7.1, LOS 7.c)

13. **(B)** **The standard error of the sample mean will increase as the sample size increases.**

Explanation

The standard error of the sample mean is equal to the sample standard deviation divided by the square root of the sample size. As the sample size increases, this ratio decreases. The other two choices are predictions of the central limit theorem.

(Module 7.1, LOS 7.b)

14. (A) the sample size n > 30.

Explanation

The Central Limit Theorem states that if the sample size is sufficiently large (i.e. greater than 30) the sampling distribution of the sample means will be approximately normal.

(Module 7.1, LOS 7.b)

15. (A) Stratified random sampling.

Explanation

In stratified random sampling, we first divide the population into subgroups based on some relevant characteristic(s) and then make random draws from each group.

(Module 7.1, LOS 7.a)

16. (C) any probability distribution.

Explanation

The central limit theorem tells us that for a population with a mean μ and a finite variance σ^2, the sampling distribution of the sample means of all possible samples of size n will be approximately normally distributed with a mean equal to μ and a variance equal to σ^2/n, no matter the distribution of the population, assuming a large sample size.

(Module 7.1, LOS 7.b)

17. (A) stratified random sampling.

Explanation

Stratified random sampling is used to preserve characteristics of an underlying dataset.

(Module 7.1, LOS 7.a)