

## Sampling and sampling distributions

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### MULTIPLE CHOICE

1. Parameters are
- numerical characteristics of a sample
  - numerical characteristics of a population
  - the averages taken from a sample
  - numerical characteristics of either a sample or a population

ANS: B                      PTS: 1                      TOP: Sampling

2. The purpose of statistical inference is to provide information about the
- sample based upon information contained in the population
  - population based upon information contained in the sample
  - population based upon information contained in the population
  - mean of the sample based upon the mean of the population

ANS: B                      PTS: 1                      TOP: Inference

3. From a group of 12 students, we want to select a random sample of 4 students to serve on a university committee. How many different random samples of 4 students can be selected?
- 48
  - 20,736
  - 16
  - 495

ANS: D                      PTS: 1                      TOP: Sampling

4. A population consists of 500 elements. We want to draw a simple random sample of 50 elements from this population. On the first selection, the probability of an element being selected is
- 0.100
  - 0.010
  - 0.001
  - 0.002

ANS: D                      PTS: 1                      TOP: Sampling

5. A population consists of 8 items. The number of different simple random samples of size 3 that can be selected from this population is
- 24
  - 56
  - 512
  - 128

ANS: B                      PTS: 1                      TOP: Combination

6. The number of random samples (without replacement) of size 3 that can be drawn from a population of size 5 is
- 15
  - 10
  - 20
  - 125

ANS: B

PTS: 1

TOP: Sampling

7. There are 6 children in a family. The number of children defines a population. The number of simple random samples of size 2 (without replacement) which are possible equals
- 12
  - 15
  - 3
  - 16

ANS: B

PTS: 1

TOP: Sampling

8. The number of different simple random samples of size 5 that can be selected from a population of size 8 is
- 40
  - 336
  - 13
  - 56

ANS: D

PTS: 1

TOP: Sampling

9. How many different samples of size 3 can be taken from a finite population of size 10?
- 30
  - 1,000
  - 720
  - 120

ANS: D

PTS: 1

TOP: Sampling

10. In point estimation
- data from the population is used to estimate the population parameter
  - data from the sample is used to estimate the population parameter
  - data from the sample is used to estimate the sample statistic
  - the mean of the population equals the mean of the sample

ANS: B

PTS: 1

TOP: Sampling

11. The sample mean is the point estimator of
- $\mu$
  - $\sigma$
  - $\bar{x}$
  - p

ANS: A

PTS: 1

TOP: Inference

12. The standard deviation of a point estimator is called the

- a. standard deviation
- b. standard error
- c. point estimator
- d. variance of estimation

ANS: B

PTS: 1

TOP: Sampling

13. The sample statistic, such as  $\bar{x}$ ,  $s$ , or  $\bar{p}$ , that provides the point estimate of the population parameter is known as

- a. a point estimator
- b. a parameter
- c. a population parameter
- d. a population statistic

ANS: A

PTS: 1

TOP: Inference

14. A simple random sample of 5 observations from a population containing 400 elements was taken, and the following values were obtained.

12      18      19      20      21

A point estimate of the mean is

- a. 400
- b. 18
- c. 20
- d. 10

ANS: B

PTS: 1

TOP: Inference

15. The following data was collected from a simple random sample of a population.

13      15      14      16      12

The point estimate of the population standard deviation is

- a. 2.500
- b. 1.581
- c. 2.000
- d. 1.414

ANS: B

PTS: 1

TOP: Inference

16. The following information was collected from a simple random sample of a population.

16      19      18      17      20      18

The point estimate of the population standard deviation is

- a. 2.000
- b. 1.291
- c. 1.414
- d. 1.667

ANS: C

PTS: 1

TOP: Inference

17. If we consider the simple random sampling process as an experiment, the sample mean is
- always zero
  - always smaller than the population mean
  - a random variable
  - exactly equal to the population mean

ANS: C                      PTS: 1                      TOP: Sampling

18. Sampling distribution of  $\bar{x}$  is the
- probability distribution of the sample mean
  - probability distribution of the sample proportion
  - mean of the sample
  - mean of the population

ANS: A                      PTS: 1                      TOP: Sampling Distribution

19. A population has a standard deviation of 16. If a sample of size 64 is selected from this population, what is the probability that the sample mean will be within  $\pm 2$  of the population mean?
- 0.6826
  - 0.3413
  - 0.6826
  - Since the mean is not given, there is no answer to this question.

ANS: A                      PTS: 1                      TOP: Inference

20. The closer the sample mean is to the population mean,
- the larger the sampling error
  - the smaller the sampling error
  - the sampling error equals 1
  - None of these alternatives is correct.

ANS: B                      PTS: 1                      TOP: Sampling

21. As the sample size increases, the
- standard deviation of the population decreases
  - population mean increases
  - standard error of the mean decreases
  - standard error of the mean increases

ANS: C                      PTS: 1                      TOP: Sampling

22. The expected value of the random variable  $\bar{x}$  is
- the standard error
  - the sample size
  - the size of the population
  - None of these alternatives is correct.

ANS: D                      PTS: 1                      TOP: Sampling

23. A population has a mean of 75 and a standard deviation of 8. A random sample of 800 is selected. The expected value of  $\bar{x}$  is
- 8
  - 75
  - 800
  - None of these alternatives is correct.

ANS: B

PTS: 1

TOP: Sampling

24. Whenever the population has a normal probability distribution, the sampling distribution of  $\bar{x}$  is a normal probability distribution for
- only large sample sizes
  - only small sample sizes
  - any sample size
  - only samples of size thirty or greater

ANS: C

PTS: 1

TOP: Sampling

25. The standard deviation of a sample of 100 elements taken from a very large population is determined to be 60. The variance of the population
- can not be larger than 60
  - can not be larger than 3600
  - must be at least 100
  - can be any value greater or equal to zero

ANS: D

PTS: 1

TOP: Sampling

26. The probability distribution of all possible values of the sample mean  $\bar{x}$  is
- the probability density function of  $\bar{x}$
  - the sampling distribution of  $\bar{x}$
  - the grand mean, since it considers all possible values of the sample mean
  - one, since it considers all possible values of the sample mean

ANS: B

PTS: 1

TOP: Sampling Distribution

27. A theorem that allows us to use the normal probability distribution to approximate the sampling distribution of sample means and sample proportions whenever the sample size is large is known as the
- approximation theorem
  - normal probability theorem
  - central limit theorem
  - central normality theorem

ANS: C

PTS: 1

TOP: Sampling

28. Random samples of size 81 are taken from an infinite population whose mean and standard deviation are 200 and 18, respectively. The distribution of the population is unknown. The mean and the standard error of the mean are
- 200 and 18
  - 81 and 18
  - 9 and 2
  - 200 and 2

ANS: D

PTS: 1

TOP: Inference

29. A population has a mean of 180 and a standard deviation of 24. A sample of 64 observations will be taken. The probability that the sample mean will be between 183 and 186 is
- 0.1359
  - 0.8185
  - 0.3413
  - 0.4772

ANS: A

PTS: 1

TOP: Sampling Distribution

30. For a population with any distribution, the form of the sampling distribution of the sample mean is
- sometimes normal for all sample sizes
  - sometimes normal for large sample sizes
  - always normal for all sample sizes
  - always normal for large sample sizes

ANS: D

PTS: 1

TOP: Sampling Distribution

31. Random samples of size 36 are taken from an infinite population whose mean and standard deviation are 20 and 15, respectively. The distribution of the population is unknown. The mean and the standard error of the mean are
- 36 and 15
  - 20 and 15
  - 20 and 0.417
  - 20 and 2.5

ANS: D

PTS: 1

TOP: Inference

32. A sample of 92 observations is taken from an infinite population. The sampling distribution of  $\bar{x}$  is approximately
- normal because  $\bar{x}$  is always approximately normally distributed
  - normal because the sample size is small in comparison to the population size
  - normal because of the central limit theorem
  - None of these alternatives is correct.

ANS: C

PTS: 1

TOP: Sampling Distribution

33. A population has a mean of 53 and a standard deviation of 21. A sample of 49 observations will be taken. The probability that the sample mean will be greater than 57.95 is
- 0
  - .0495
  - .4505
  - .9505

ANS: B

PTS: 1

TOP: Sampling Distribution

34. Doubling the size of the sample will
- reduce the standard error of the mean to one-half its current value
  - reduce the standard error of the mean to approximately 70% of its current value
  - have no effect on the standard error of the mean
  - double the standard error of the mean

ANS: B

PTS: 1

TOP: Sampling

35. As the sample size increases, the variability among the sample means
- increases
  - decreases
  - remains the same
  - depends upon the specific population being sampled

ANS: B                      PTS: 1                      TOP: Sampling

36. Random samples of size 17 are taken from a population that has 200 elements, a mean of 36, and a standard deviation of 8. Which of the following best describes the form of the sampling distribution of the sample mean for this situation?
- approximately normal because the sample size is small relative to the population size
  - approximately normal because of the central limit theorem
  - exactly normal
  - None of these alternatives is correct.

ANS: D                      PTS: 1                      TOP: Sampling Distribution

37. The following data was collected from a simple random sample of a population.

13      15      14      16      12

The mean of the population

- is 14
- is 15
- is 15.1581
- could be any value

ANS: D                      PTS: 1                      TOP: Inference

**Exhibit 7-1**

A random sample of 121 bottles of cologne showed an average content of 4 ounces. It is known that the standard deviation of the contents (i.e., of the population) is 0.22 ounces.

38. Refer to Exhibit 7-1. The point estimate of the mean content of the bottles is
- 0.22
  - 4
  - 121
  - 0.02

ANS: B                      PTS: 1                      TOP: Sampling Distribution

39. The probability distribution of all possible values of the sample proportion  $\bar{p}$  is the
- probability density function of  $\bar{p}$
  - sampling distribution of  $\bar{x}$
  - same as  $\bar{p}$ , since it considers all possible values of the sample proportion
  - sampling distribution of  $\bar{p}$

ANS: D                      PTS: 1                      TOP: Sampling Distribution

40. A sample of 400 observations will be taken from an infinite population. The population proportion equals 0.8. The probability that the sample proportion will be greater than 0.83 is
- a. 0.4332
  - b. 0.9332
  - c. 0.0668
  - d. 0.5668

ANS: C

PTS: 1

TOP: Sampling Distribution

41. Random samples of size 100 are taken from an infinite population whose population proportion is 0.2. The mean and standard deviation of the sample proportion are
- a. 0.2 and .04
  - b. 0.2 and 0.2
  - c. 20 and .04
  - d. 20 and 0.2

ANS: A

PTS: 1

TOP: Sampling Distribution

42. A sample of 25 observations is taken from an infinite population. The sampling distribution of  $\bar{p}$  is
- a. not normal since  $n < 30$
  - b. approximately normal because  $\bar{p}$  is always normally distributed
  - c. approximately normal if  $np \geq 5$  and  $n(1-P) \geq 5$
  - d. approximately normal if  $np > 30$  and  $n(1-P) > 30$

ANS: C

PTS: 1

TOP: Sampling Distribution

43. A sample of 51 observations will be taken from an infinite population. The population proportion equals 0.85. The probability that the sample proportion will be between 0.9115 and 0.946 is
- a. 0.8633
  - b. 0.6900
  - c. 0.0819
  - d. 0.0345

ANS: C

PTS: 1

TOP: Sampling Distribution

44. Four hundred people were asked whether gun laws should be more stringent. Three hundred said "yes," and 100 said "no." The point estimate of the proportion in the population who will respond "yes" is
- a. 300
  - b. approximately 300
  - c. 0.75
  - d. 0.25

ANS: C

PTS: 1

TOP: Inference



**Exhibit 7-2**

A random sample of 10 examination papers in a course, which was given on a pass or fail basis, showed the following scores.

Paper Number	Grade	Status
1	65	Pass
2	87	Pass
3	92	Pass
4	35	Fail
5	79	Pass
6	100	Pass
7	48	Fail
8	74	Pass
9	79	Pass
10	91	Pass

45. Refer to Exhibit 7-2. The point estimate for the mean of the population is
- 750
  - 100
  - 85
  - 75

ANS: D                      PTS: 1                      TOP: Sampling Distribution

46. Refer to Exhibit 7-2. The point estimate for the variance of the population is
- 419.43
  - 20.48
  - 75
  - 750

ANS: A                      PTS: 1                      TOP: Sampling Distribution

**Exhibit 7-3**

In a local university, 40% of the students live in the dormitories. A random sample of 80 students is selected for a particular study.

47. Refer to Exhibit 7-3. The standard deviation of  $\bar{p}$ , known as the standard error of the proportion is approximately
- 0.5477
  - 5.477
  - 0.05477
  - 54.77

ANS: C                      PTS: 1                      TOP: Sampling Distribution

48. Refer to Exhibit 7-3. The probability that the sample proportion (the proportion living in the dormitories) is at least 0.30 is
- 0.4664
  - 0.9328
  - 0.9664
  - 0.0336

ANS: C                      PTS: 1                      TOP: Sampling Distribution