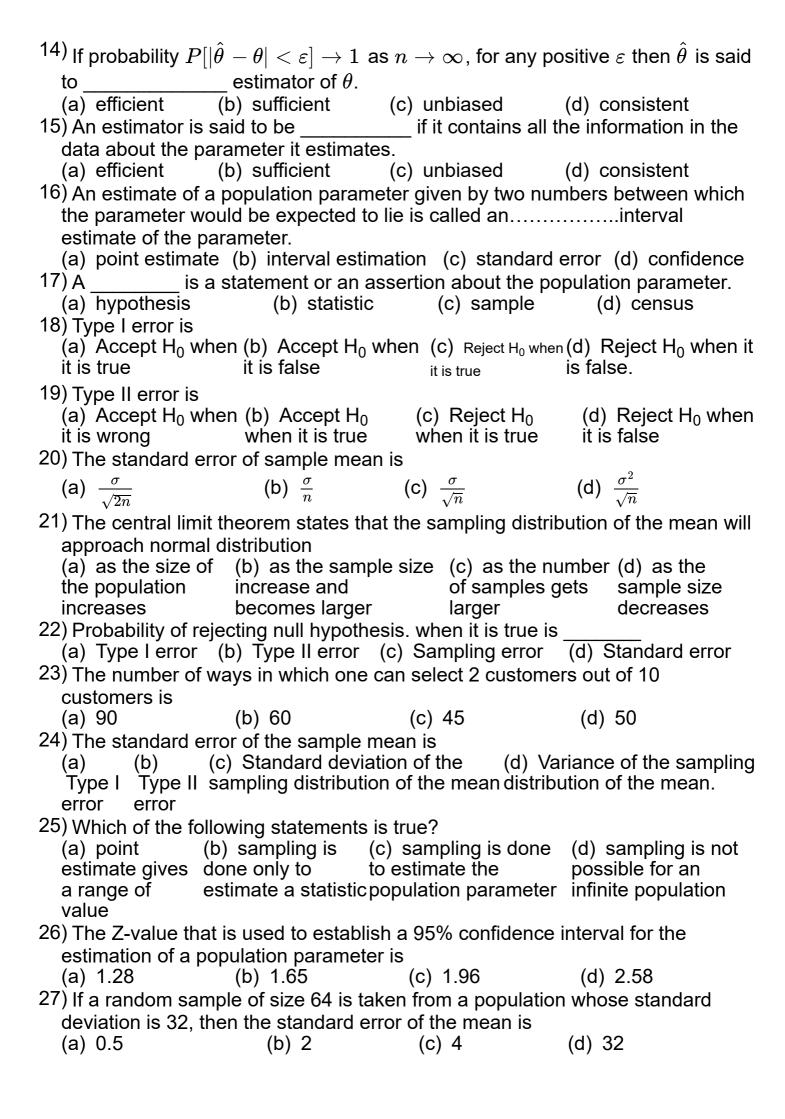## REDUCED Sampling Techniques and Statistical Inference
12th Standard

Business Maths

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40 x 1 = 40

1) A _____ may be finite or infinite according as the number of observations or items in it is finite or infinite.
   (a) Population   (b) census   (c) parameter   (d) none of these

2) A _____ of statistical individuals in a population is called a sample.
   (a) Infinite set   (b) finite subset   (c) finite set   (d) entire set

3) A finite subset of statistical individuals in a population is called _____
   (a) a sample   (b) a population   (c) universe   (d) census

4) Any statistical measure computed from sample data is known as

   _____
   (a) parameter   (b) statistic   (c) infinite measure   (d) uncountable

5) A_____is one where each item in the universe has an equal chance of known opportunity of being selected.
   (a) Parameter   (b) random sample   (c) statistic   (d) entire data

6) A random sample is a sample selected in such a way that every item in the population has an equal chance of being included
   (a) Harper   (b) Fisher   (c) Karl Pearson   (d) Dr. Yates

7) Which one of the following is probability sampling
   (a) purposive sampling   (b) judgment sampling   (c) simple random sampling   (d) Convenience sampling

8) In simple random sampling from a population of N units, the probability of drawing any unit at the first draw is
   (a) $\frac{n}{N}$ (b) $\frac{1}{N}$ (c) $\frac{N}{n}$ (d) 1

9) In _____ the heterogeneous groups are divided into homogeneous groups.
   (a) Non-probability sample   (b) a simple random sample   (c) a stratified random sample   (d) systematic random sample

10) Errors in sampling are of
   (a) Two types   (b) three types   (c) four types   (d) five types

11) The method of obtaining the most likely value of the population parameter using statistic is called _____
   (a) estimation   (b) estimator   (c) biased estimate   (d) standard error.

12) An estimator is a sample statistic used to estimate a
   (a) population parameter   (b) biased estimate (c) sample size (d) census

13) _____ is a relative property, which states that one estimator is efficient relative to another.
   (a) efficiency   (b) sufficiency   (c) unbiased   (d) consistency

14) If probability $P[|\hat{\theta} - \theta| < \varepsilon] \to 1$ as $n \to \infty$, for any positive ε then $\hat{\theta}$ is said to _____ estimator of θ.

(a) efficient   (b) sufficient   (c) unbiased   (d) consistent

15) An estimator is said to be _____ if it contains all the information in the data about the parameter it estimates.

(a) efficient   (b) sufficient   (c) unbiased   (d) consistent

16) An estimate of a population parameter given by two numbers between which the parameter would be expected to lie is called an……………..interval estimate of the parameter.

(a) point estimate   (b) interval estimation   (c) standard error   (d) confidence

17) A _____ is a statement or an assertion about the population parameter.

(a) hypothesis   (b) statistic   (c) sample   (d) census

18) Type I error is

(a) Accept H_0 when it is true   (b) Accept H_0 when it is false   (c) Reject H_0 when it is true   (d) Reject H_0 when it is false.

19) Type II error is

(a) Accept H_0 when it is wrong   (b) Accept H_0 when it is true   (c) Reject H_0 when it is true   (d) Reject H_0 when it is false

20) The standard error of sample mean is

(a) $\dfrac{\sigma}{\sqrt{2n}}$ (b) $\dfrac{\sigma}{n}$ (c) $\dfrac{\sigma}{\sqrt{n}}$ (d) $\dfrac{\sigma^2}{\sqrt{n}}$

21) The central limit theorem states that the sampling distribution of the mean will approach normal distribution

(a) as the size of the population increases   (b) as the sample size increase and becomes larger   (c) as the number of samples gets larger   (d) as the sample size decreases

22) Probability of rejecting null hypothesis. when it is true is _____

(a) Type I error   (b) Type II error   (c) Sampling error   (d) Standard error

23) The number of ways in which one can select 2 customers out of 10 customers is

(a) 90   (b) 60   (c) 45   (d) 50

24) The standard error of the sample mean is

(a) Type I error   (b) Type II error   (c) Standard deviation of the sampling distribution of the mean   (d) Variance of the sampling distribution of the mean.

25) Which of the following statements is true?

(a) point estimate gives a range of value   (b) sampling is done only to estimate a statistic   (c) sampling is done to estimate the population parameter   (d) sampling is not possible for an infinite population

26) The Z-value that is used to establish a 95% confidence interval for the estimation of a population parameter is

(a) 1.28   (b) 1.65   (c) 1.96   (d) 2.58

27) If a random sample of size 64 is taken from a population whose standard deviation is 32, then the standard error of the mean is

(a) 0.5   (b) 2   (c) 4   (d) 32

28) The mean I.Q. of a sample of 1600 children was 99. It is likely that this was a r.sample from a population with mean I.Q. 100 and S.D 15^2 Then the value of Z is
(a) -2.667   (b) 2.667   (c) 1.96   (d) 2.58

29) Out of 1000 T.V viewers, 320 watched a particular programme. Then the standard error is
(a) -0.147   (b) 0.147   (c) 0.0147   (d) -0.0147

30) A random sample of 500 apples was taken from large consignment and 45 of them were found to be bad. Then the standard error is
(a) 0.033   (b) 0.0128   (c) 0.0128   (d) 0.00128

31) A sample of 100 students are drawn from 1550 student of a school. The mean weight and variance of the sample are 67.45 kg and 9 kg. Then the standard error is _____
(a) .3   (b) .9   (c) .6745   (d) 6.745

32) The point estimate mean of the following data is _____.
21.1, 25.0, 20.0, 16.0, 12.0, 10.0, 17.0, 18.0, 13.0, 11.0
(a) 16.3   (b) 13.6   (c) 21.21   (d) 212:10

33) The point estimate variance of 21, 25, 20, 16, 12, 10, 17, 18, 13 and 11 is _____
(a) 23.5   (b) 2.35   (c) 4.85   (d) 48.5

34) The point estimate means of 6.33, 6.37, 6.36, 6.32, 6.37 is _____
(a) 6.33   (b) 6.36   (c) 6.35   (d) 6.37

35) The point estimate variance of 6.33, 6.37, 6.36, 6.32, 6.37 is
(a) 0.0022   (b) 0.00055   (c) 0.0055   (d) 0.055

36) There are _____ branches of statistical inference.
(a) 1   (b) 2   (c) 3   (d) 4

37) An _____ is a specific observed value of a statistic
(a) Estimation   (b) Estimator   (c) Estimate   (d) Testing of hypothesis

38) If 55 is the mean mark obtained by a sample of 5 students randomly drawn from a class of 100 students is considered to the means marks of the entire class. This single value 55 is a
(a) estimation   (b) estimate   (c) point estimate   (d) estimator

39) If α is the level of significance. then the confidence Co-efficient is
(a) α   (b) 1   (c) 1-α   (d) 1+α

40) Any hypothesis which is complementary to the null hypothesis is _____ hypothesis.
(a) Null   (b) Alternative   (c) Statistical   (d) testing

41) Using the Kendall-Babington Smith - Random number table, Draw 5 random samples.

23	15	75	48	59	01	83	72	59	93	76	24	97	08	86	95	23	03	67	44	
05	54	55	50	43	10	53	74	35	08	90	61	18	37	44	10	96	22	13	43	
14	87	16	03	50	32	40	43	62	23	50	05	10	03	22	11	54	36	08	34	
38	97	67	49	51	94	05	17	58	53	78	80	59	01	94	32	42	87	16	95	
97	31	26	17	18	99	75	53	08	70	94	25	12	58	41	54	88	21	05	13	

42) Using the following Tippett's random number table,

2952	6641	3992	9792	7969	5911	3170	5624
4167	9524	1545	1396	7203	5356	1300	2693
2670	7483	3408	2762	3563	1089	6913	7991
0560	5246	1112	6107	6008	8125	4233	8776
2754	9143	1405	9025	7002	6111	8816	6446

Draw a sample of 15 houses from Cauvery Street which has 83 houses in total.

43) A server channel monitored for an hour was found to have an estimated mean of 20 transactions transmitted per minute. The variance is known to be 4. Find the standard error.

44) A sample of 100 students is chosen from a large group of students. The average height of these students is 162 cm and standard deviation (S.D) is 8 cm. Obtain the standard error for the average height of large group of students of 160 cm?

45) What is population?

46) What is sample?

47) What is statistic?

48) Define parameter

49) What is sampling distribution of a statistic?

50) What is standard error?

51) State any two merits of simple random sampling.

52) State any two demerits of systematic random sampling.

53) State any two merits for systematic random sampling.

54) Mention two branches of statistical inference?

55) What is an estimator?

56) What is an estimate?

57) What is point estimation?

58) What is interval estimation?

59) What is confidence interval?

60) A random sample of size 50 with mean 67.9 is drawn from a normal population. If it is known that the standard error of the sample $\sqrt{0.7}$, find 95% confidence interval for the population mean.

61) Out of 1000 T.V. viewers, 320 watched a particular programme. Calculate the standard error.

62) Out of 1500 school students, a sample of 150 selected to test the accuracy of solving a problem in B.M. and of them 10 did a mistake. Calculate the standard error of sample proportion.

17 x 3 = 51

63) Using the following random number table (Kendall-Babington Smith)

23	15	75	48	59	01	83	72	59	93	76	24	97	08	86	95	23	03	67	44
05	54	55	50	43	10	53	74	35	08	90	61	18	37	44	10	96	22	13	43
14	87	16	03	50	32	40	43	62	23	50	05	10	03	22	11	54	36	08	34
38	97	67	49	51	94	05	17	58	53	78	80	59	01	94	32	42	87	16	95
97	31	26	17	18	99	75	53	08	70	94	25	12	58	41	54	88	21	05	13

Draw a random sample of 10 four- figure numbers startingfrom 1550 to 8000.

64) From the following data, select 68 random samples from the population of heterogeneous group with size of 500 through stratified random sampling, considering the following categories as strata.
Category1: Lower income class -39%
Category2: Middle income class - 38%
Category3: Upper income class- 23%

65) Find the sample size for the given standard deviation 10 and the standard error with respect of sample mean is 3.

66) A die is thrown 9000 times and a throw of 3 or 4 is observed 3240 times. Find the standard error of the proportion for an unbiased die .

67) The standard deviation of a sample of size 50 is 6.3. Determine the standard error whose population standard deviation is 6?

68) Explain in detail about sampling error.

69) Explain in detail about non-sampling error.

70) State any three merits of stratified random sampling.

71) Using the following Tippet's random number table.

2952	6641	3992	9792	7969	5911	3170	5624
4167	9524	1545	1396	7203	5356	1300	2693
2670	7483	3408	2762	3563	1089	6913	7991
0560	5246	1112	6107	6008	8125	4233	8776
2754	9143	1405	9025	7002	6111	8816	6446

Draw a sample of 10 three digit numbers which are even numbers.

72) A wholesaler in apples claims that only 4% of the apples supplied by him are defective. A random sample of 600 apples contained 36 defective apples. Calculate the standard error concerning of good apples

73) A sample of 1000 students whose mean weight is 119 lbs(pounds) from a school in Tamil Nadu State was taken and their average weight was found to be 120 lbs with a standard deviation of 30 lbs. Calculate standard error of mean.

74) A sample of 100 items, draw from a universe with mean value 4 and S.D 3, has a mean value 63.5. Is the difference in the mean significant?

75) Write short note on sampling distribution and standard error.

76) Determine the standard error of proportion for a random sample of 500 pineapples was taken from a large consignment and 65 were found to be bad.

77) A random sample of 500 apples was taken from large consignment and 45 of them were found to be bad. Find the limits at which the bad apples lie at 99% confidence level.

78) A sample of five measurements of the diameter of a sphere were recorded by a scientist as 6.33, 6.37,6.36,6.32 and 6.37 mm. Determine the point estimate of (a) mean (b) variance.

79) A random sample of marks in mathematics secured by 50 students out of 200 students showed a mean of 75 and a standard deviation of 10. Find the 95% confidence limits for the estimate of their mean marks.

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80) Using the following random number table,

Tippet's random number table							
2952	6641	3992	9792	7969	5911	3170	5624
4167	9524	1545	1396	7203	5356	1300	2693
2670	7483	3408	2762	3563	1089	6913	7991
0560	5246	1112	6107	6008	8125	4233	8776
2754	9143	1405	9025	7002	6111	8816	6446

Draw a sample of 10 children with theirheight from the population of 8,585 children as classified hereunder.

Height (cm)	105	107	109	111	113	115	117	119	121	123	125
Number of children	2	4	14	41	83	169	394	669	990	1223	1329
Height(cm)	127	129	131	133	135	137	139	141	143	145	
No. of children	1230	1063	646	392	202	79	32	16	5	2	

81) A machine produces a component of a product with a standard deviation of 1.6 cm in length. A random sample of 64 componentsvwas selected from the output and this sample has a mean length of 90 cm. The customer will reject the part if it is either less than 88 cm or more than 92 cm. Does the 95% confidence interval for the true mean length of all the components produced ensure acceptance by the customer?

82) A sample of 100 measurements at breaking strength of cotton thread gave a mean of 7.4 and a standard deviation of 1.2 gms. Find 95% confidence limits for the mean breaking strength of cotton thread.

83) The mean life time of a sample of 169 light bulbs manufactured by a company is found to be 1350 hours with a standard deviation of 100 hours. Establish 90% confidence limits within which the mean life time of light bulbs is expected to lie.

84) An auto company decided to introduce a new six cylinder car whose mean petrol consumption is claimed to be lower than that of the existing auto engine. It was found that the mean petrol consumption for the 50 cars was 10 km per litre with a standard deviation of 3.5 km per litre. Test at 5% level of significance, whether the claim of the new car petrol consumption is 9.5 km per litre on the average is acceptable.

85) (i) A sample of 900 members has a mean 3.4 cm and SD 2.61 cm. Is the sample taken from a large population with mean 3.25 cm. and SD 2.62 cm? (ii) If the population is normal and its mean is unknown, find the 95% and 98% confidence limits of true mean.

86) An ambulance service claims that it takes on the average 8.9 minutes to reach its destination in emergency calls. To check on this claim, the agency which licenses ambulance services has them timed on 50 emergency calls, getting a mean of 9.3 minutes with a standard deviation of 1.6 minutes. What can they conclude at the level of significance

87) Explain in detail about simple random sampling with a suitable example.

88) Explain the stratified random sampling with a suitable example.

89) Explain in detail about systematic random sampling with example.

90) A random sample of 60 observations was drawn from a large population and its standard deviation was found to be 2.5. Calculate the suitable standard error that this sample is taken from a population with standard deviation 3?

91) In a sample of 400 population from a village 230 are found to be eaters of vegetarian items and the rest non-vegetarian items. Compute the standard error assuming that both vegetarian and non-vegetarian foods are equally popular in that village?

92) A sample of 400 individuals is found to have a mean height of 67.47 inches. Can it be reasonably regarded as a sample from a large population with mean height of 67.39 inches and standard deviation 1.30 inches?

93) The average score on a nationally administered aptitude test was 76 and the corresponding standard deviation was 8. In order to evaluate a state's education system, the scores of 100 of the state's students were randomly selected. These students had an average score of 72. Test at a significance level of 0.05 if there is a significant difference between the state scores and the national scores.

94) Explain the types of sampling.

95) Explain in detail about the test of significance for single mean

96) A sample of 100 students are drawn from a school. The mean weight and variance of the sample are 67.45 kg and 9 kg. respectively. Find
(a) 95% and
(b) 99% confidence intervals for estimating the mean weight of the students.

97) Measurements of the weights of a random sample of 200 ball bearings made by certain machine during one week showed a mean of 0.824 newtons and a S.D. of 0.042 newton's. Find a) 95% and b) 99% confidence limits for the mean weight of all the ball bearings.

98) A sample poll of 100 voters chosen at random from all voters in a given district indicated that 55% of them were in favour of a particular candidate. Find (a) 95% confidence limits (b) 99% confidence limits for the proportion to all voters in favour of this candidate.

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