EXAM 3

Yvonne Quigua

Mat 340 Statistics

Professor Ashanti

04/26/2023

.Question 1

The sampling distribution is the probability distribution of a:

D) Sample statistic

Question 2

The probability distribution of a sample statistic is the:

C) Sampling distribution of that statistic

Question 3

The sampling error is:

B) The difference between the value of a sample statistic and the value of the corresponding population parameter

Question 4

An error that occurs because of chance is called:

A) Non-sampling error

Question 5

An error that occurs because of human mistakes is called:

A) Non sampling error

Question 6

The mean age of all students at a university is 24 years. The mean age of a random sample of 100 students selected from this university is 23.6 years. The difference (23.6 - 24 = -0.4) is the:

B) Sampling error

Question 7

The mean weekly earnings of all employees of a company are $822. The mean weekly earnings of a random sample of 25 employees selected from this company is $837. The difference ($837 -$822 = $15) is the:

C) Sampling error

Question 8

The mean of the sampling distribution of the sample mean is:

C) always equal to the population mean

Question 9 _ Is less than or equal to 0.05, the standard deviation of the sampling distribution of the sample Mean is equal to the population standard deviation:

C) Divided by the square root of the sample size

Question 10

Estimation is a procedure by which we assign a numerical value or numerical values to the:

A) Population parameter based on the information collected from a sample

Question 11

The values assigned to a population parameter based on the value(s) of a sample statistic are:

D) Estimate

Question 12

The sample statistic used to estimate a population parameter is a (n):

C) Estimator

Question 13

The single value of a sample statistic that we assign to the population parameter is a:

C) Point estimate

Question 14

The confidence level of an interval estimate is denoted by:

B) $(1-\alpha)\times 100\%$

Question 15

For most distributions, we can use the normal distribution to make a confidence interval for a population mean provided that the population standard deviation is known and the sample size is:

A) greater than 30

Question 16

The margin of error for the population mean, assuming n is known, is:

A) Z multiplied by the population standard deviation

Question 17

The *z* value for a 90% confidence interval for the population mean with known is: σ

B) 1.645

Question 18

The *z* value for an 85% confidence interval for the population mean with known is: σ

C) 1.44

Question 19

The width of a confidence interval depends on the size of the:

B) Margin of error

Question 20

The null hypothesis is a claim about a:

B) Parameter, where the claim is assumed to be true until it is declared false

Question 21

The alternative hypothesis is a claim about a:

B) parameter, where the claim is assumed to be true if the null hypothesis is declared false

Question 22

In a one-tailed hypothesis test, a critical point is a point that divides the area under the sampling distribution of a:

A) Statistic into one rejection region and one non rejection region

Question 23

In a hypothesis test, a Type I error occurs when:

D) a true null hypothesis is rejected

Question 24

In a hypothesis test, a Type II error occurs when:

C) A false null hypothesis is not rejected

Question 25

In a hypothesis test, the probability of committing a Type I error is called the:

C) Significance level

Question 26

A one-tailed hypothesis test contains:

D) one rejection region and one non rejection region

Question 27

In a left-tailed hypothesis test, the sign in the alternative hypothesis is:

C) less than (<)

Question 28

In a two-tailed hypothesis test, the sign in the alternative hypothesis is:

A) not equal to $(\neq)$

Question 29

In a right-tailed hypothesis test, the sign in the alternative hypothesis is:

B) greater than $(>)$

Question 30

A researcher wants to test if the mean price of houses in an area is greater than $145,000. The alternative hypothesis for this example will be that the population mean is:

D) Greater than $145,000

Short Response (10 points for each question # 31-36)

Question 31

The mean price of all magazines published in the United States is $3.65. The mean price of a random sample of 16 magazines is $4.30. The sampling error is:

Sampling error=4.30-3.65

Sampling error=$0.65

Question 32

A population contains 8 members. The total number of samples of size 4 that you can select (without replacement) from this population is:

$8C_4 \times 7C_3 \times 6C_2 \times 5C_1 = 183{,}750$

Question 33

A sample of size 65 from a population having standard deviation σ= 55 produced a mean of

The 95% confidence interval for the population mean (rounded to two decimal places).

Given n=65

Sigma=55

Mean=234

Confidence level=95%

At 95% confidence level

1-alpha=95%

1-alpha=0.95

Alpha=0.05

Alpha/2=0.025

Z (0.025) =1.96

Margin of error= Z (0.025)*sigma/sqrt (n)

E=1.96*55/sqrt (65)

E=13.37

The confidence interval for mean is given by

X bar-E, X bar+E

234-13.37, 234+13.37

(220.63, 247.37)

Lower limit=220.63

Upper limit=247.37

Question 34

A researcher wants to make a 95% confidence interval for a population mean. She wants the margin of error to be within 1.9 of the population mean. The population standard deviation is 11.07. The sample size that will yield a margin of error within 1.9 of the population mean is:

Sigma=11.07

ME=1.9

Z=1.96

ME=Z*sigma/sqrt (n)

1.9=1.96*(11.07/sqrt (n)

Sqrt (n) =21.6972

N=471

Question 35

A two-tailed hypothesis test using the normal distribution reveals that the area under the sampling distribution curve of the mean and located to the right of the sample mean equals 0.032. Consequently, the *p*-value for this test equals:

P-value=0.032/2=0.016, since it is a two tailed.

Question 36

In a hypothesis test with hypotheses and $H_0 : \mu \geq 37$ $H_1 : \mu < 37$, a random sample of 59 elements Selected from the population produced a mean of 35.8. Assuming that $\sigma = 9.9$, what is the approximate *p*-value for this test? (Round your answer to four decimal places)

n=59, X bar=35.8, sigma=9.9

Alpha=0.05

Under the null hypothesis the test statistics is; $Z = \overline{X} - \mu /$¿

Z=(35.8-37)/(9.9/$\sqrt{59}$

Z=-0.9310

Since alternative hypothesis is a left tailed, we shall apply left tailed test for test of significance level 5%.

The p-value can be calculated as;

P-value=P (Z<-0.93)

=0.176

Extended Response (20 points for each question #37-38)

Question 37

A researcher wants to test if the mean price of houses in an area is greater than $145,000. A random sample of 35 houses selected from the area produces a mean price of $149,700. Assume that σ = $13,100, and that the test is to be made at the 1% significance level.

What is the critical value of *z*?

D) 2.58

What is the value of the test statistic, *z*, rounded to three decimal places?

$$Z=\frac{\overline{X}-\mu}{\sigma/\sqrt{n}}$$

$$Z=\frac{149700-145000}{13100/\sqrt{35}}$$

Z=2.123

What is the *p*-value for this hypothesis test, rounded to four decimal places?

P-value=P (Z>2.123)

P-value=0.963

Should you reject or fail to reject the null hypothesis in this test? (State your answer as "reject" or "fail to reject", but don't include the quotation marks.)

Fail to reject the null hypothesis since p-value is greater than alpha value.

Question 38

The Labor Bureau wants to estimate, at a 90% confidence level, the proportion of all households that receive welfare. A preliminary sample showed that 18.5% of households in this sample receive welfare. The sample size that would limit the margin of error to be within 0.036 of the population proportion is:

ME=0.036

For 90% CI critical Z=1.645

Estimated prop. =p=0.185

Sample size, n=p*(1-p)*(z/E) ^2

0.185(0.815)*(1.645/0.036) ^2

=0.150775*2087.982253

=315