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Paper: **Statistical Inference**

Q1: Differentiate between the following with example.

**SOLUTION:**

**Statistic and parameter:**

|  |  |
| --- | --- |
| **Parameter**  | **Statistic** |
| A parameter is a fixed measure describing the whole population, like people, things, and animals. | A statistic is a characteristic of a sample, a portion of the target population. |
| A parameter is a fixed, unknown value. | While statistic is a known number and variance which depends on a portion of the population. |
| **Example:** The mean income of the subscribers to a particular magazine. | The followers of each religion in a particular country. |

|  |  |
| --- | --- |
| **Cluster**  | **Strata** |
| In which the population is divided into already existing grouping.Heterogeneous. | Entire population is divided into various mutually exclusive, homogenous and non-overlapping subgroups known as strata. |
| Sample of the cluster is selected randomly from the population. | The sample is drawn randomly from each stratum. |
| **Example:** In a survey of students from a city, first select a sample of school, then we select a sample of class rooms with in the selected schools and finally we select a sample of students within the selected classes. | One might divide a sample of adults into subgroups by age, gender, height etc |

**Q2: Choose the correct answer.**

1. Given a standard normal distribution, what is the probability that Z>1.84?

**b. 0.0329.**

2. Consider a normal distribution with mean 12 and variance 9 , what will be the P (5.5 <X<18) ?

**a. 0.9772 (When I solve the numerical I got this answer 0.9622).**

3. Examination marks are normally distributed with the mean of 85 and a standard

deviation of 4.6.To qualify for an interview, how much marks should be scored if

more than 80% scoring is acceptable?

**a.88.8 (When I solve the numerical I got this answer, 86.21).**

4. Standard error for sampling distribution is always

**b. Less than that of population standard error**.

Q3. Consider a population { 11 , 25 , 16 , 4}, find

Number of samples if sampling is done without replacement. Also write the

samples.

**SOLUTION:**

Total number of samples= ( N n) = (4 2) = 4×3×2/2 : 2 = 6

|  |  |
| --- | --- |
| **Sample** | **mean (x̅)** |
| (11, 25) | 18 |
| (11,16) | 13.5 |
| (11,4) | 7.5 |
| (25,16) | 20.5 |
| (25,4) | 14.5 |
| (16,4) | 10 |

|  |  |
| --- | --- |
| **X** | **X2** |
| 11 | 121 |
| 25 | 625 |
| 16 | 256 |
| 4 | 16 |
| **∑x=56** | **∑x=1018** |

µ= ∑x/N = 56/4 = 14

Population mean and the mean of sampling distribution

|  |  |  |  |
| --- | --- | --- | --- |
| **X̅** | **f** | **f(x)** | **x̅f(x̅)** |
| 18 | 1 | 1/6 | 18/6 |
| 13.5 | 1 | 1/6 | 13.5/6 |
| 7.5 | 1 | 1/6 | 7.5/6 |
| 20.5 | 1 | 1/6 | 20.5/6 |
| 14.5 | 1 | 1/6 | 14.5/6 |
| 10 | 1 | 1/6 | 10/6 |
|  |  |  | **∑x̅f(x̅)=84/6** |

Mean of sampling distribution of x̅ ∑x̅f(x̅) = 84/6 = 14

Thus µ = ∑x̅f(x̅)

Q4. On the basis of last month courier charges, John wants to estimate the mean for

the next month .For this reason, a sample of 35 packets are chosen that shows a mean

of $10.50 with a standard deviation of $1.25.Construct 85% confidence interval for

the mean charges.

**SOLUTION:**

n = 35, x̅ = 10.5, s= 1.25

85% C.I for µ

1-α= 85%

α= 0.15

x̅ ± Zα/2 σ/√n (I assumed Zα/2 = 0.55962 as I don’t have Z-table )

10.5± o.55962 × 1.25/√35

10.5± 0.11824

(10.38175 , 10.6182)

Q5: A random sample of 500 members of the labor force in an area showed that 44

are unemployed. Construct 70% confidence interval for the proportion of unemployed

labor in the area.

**SOLUTION:**

n= 500

p̂= 44/500 = 0.088

q̂ = 1-p̂ = 0.912

The 70% C.I will

1-α = 70%

α= 0.3 (I assumed Zα/2 = 0.61791)

p̂± Zα/2 p̂q̂/√n

0.088 ± 0.61791 × (0.088)(0.912)/√500

0.088 ± 0.04959/√500

0.088 ± 0.002218

0.085782 , 0.090218

Q6: Fill in the blanks.

i) **EQUAL**

ii) **STANDARD DAVIATION**

iii) **7.4**

iv) **PURPOSIVE sampling.**

v) **n-1 for one sample**

**n1+n2- 2 for two sample**

Q7: Compute the sample size with the following given information. (3)

Allowable error= 12 Confidence interval= 99% Std.deviation =144

OR

Find the tabulated value for z and t.

 N=45 CI=80%

 N= 15 CI= 50%

P(z> 2.37 )

**SOLUTION:**

As with allowable error =12, C.I = 99% , σ= 144 you cannot find sample size

Same is the case with second option.