

CUET Mathematics Test

Chapter: Unit VI: Inferential Statistics

SOLUTIONS

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Solutions

1. **Solution:** The population is the entire group that is the target of the study. In this case, all adult males in India. **Correct Option: (C)**
2. **Solution:** A numerical summary of a sample is called a statistic. A summary of a population is a parameter. **Correct Option: (B)**
3. **Solution:** The Central Limit Theorem states that as n increases (usually $n \geq 30$), the sampling distribution of the mean approaches normality. **Correct Option: (C)**
4. **Solution:** The Standard Error (SE) of the mean is defined as the standard deviation of the population divided by the square root of the sample size: $SE = \sigma/\sqrt{n}$. **Correct Option: (B)**
5. **Solution:** The t-test is specifically designed for small samples ($n < 30$) when the population standard deviation (σ) is unknown and replaced by the sample standard deviation (s). **Correct Option: (B)**
6. **Solution:** For a one-sample t-test, $df = n - 1$. Here, $15 - 1 = 14$. **Correct Option: (C)**
7. **Solution:** For an independent two-sample t-test, $df = n_1 + n_2 - 2$. Here, $10 + 12 - 2 = 20$. **Correct Option: (B)**
8. **Solution:** A null hypothesis tested against an "not equal to" alternative (\neq) requires looking at both tails of the distribution. **Correct Option: (C)**
9. **Solution:** $t = (\bar{x} - \mu)/(s/\sqrt{n}) = (50 - 46)/(6/\sqrt{9}) = 4/(6/3) = 4/2 = 2.0$. **Correct Option: (A)**
10. **Solution:** As df increases, the tails of the t-distribution become thinner and the peak higher, eventually matching the Standard Normal (Z) distribution. **Correct Option: (C)**
11. **Solution:** Statement (B) is false. CLT states that the sampling distribution becomes approximately normal as n increases, even if the population is skewed. **Correct Option: (B)**
12. **Solution:** If the calculated value exceeds the critical value, the difference is statistically significant, and we reject the null hypothesis. **Correct Option: (B)**
13. **Solution:** The standard independent two-sample t-test assumes that the two populations have the same variance, necessitating the calculation of a pooled variance. **Correct Option: (A)**
14. **Solution:** The standard deviation of any sampling distribution (of mean, proportion, etc.) is called the Standard Error. **Correct Option: (C)**
15. **Solution:** $t = (495 - 500)/(10/\sqrt{25}) = -5/(10/5) = -5/2 = -2.5$. **Correct Option: (A)**
16. **Solution:** Gosset published his work under the name "Student" because his employer (Guinness Brewery) forbade employees from publishing. **Correct Option: (B)**
17. **Solution:** The confidence interval is centered around the sample mean. $\text{Mean} = (45 + 55)/2 = 50$. **Correct Option: (A)**

18. **Solution:** Since the calculated value is exactly equal to the critical value (on the boundary), it is considered significant at that level (just barely hitting the rejection region). **Correct Option: (A)**
19. **Solution:** Homoscedasticity refers to the assumption that different groups or samples have equal variances. **Correct Option: (B)**
20. **Solution:** $SE = 16/\sqrt{64} = 16/8 = 2$. $Z = (102 - 100)/2 = 1$. $P(Z > 1) = 0.5 - P(0 < Z < 1) = 0.5 - 0.3413 = 0.1587$. **Correct Option: (A)**

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