CUET (UG) – MATHEMATICS

Chapter Test - Section B2: Applied Mathematics - Unit VI: Inferential Statistics

SOLUTIONS

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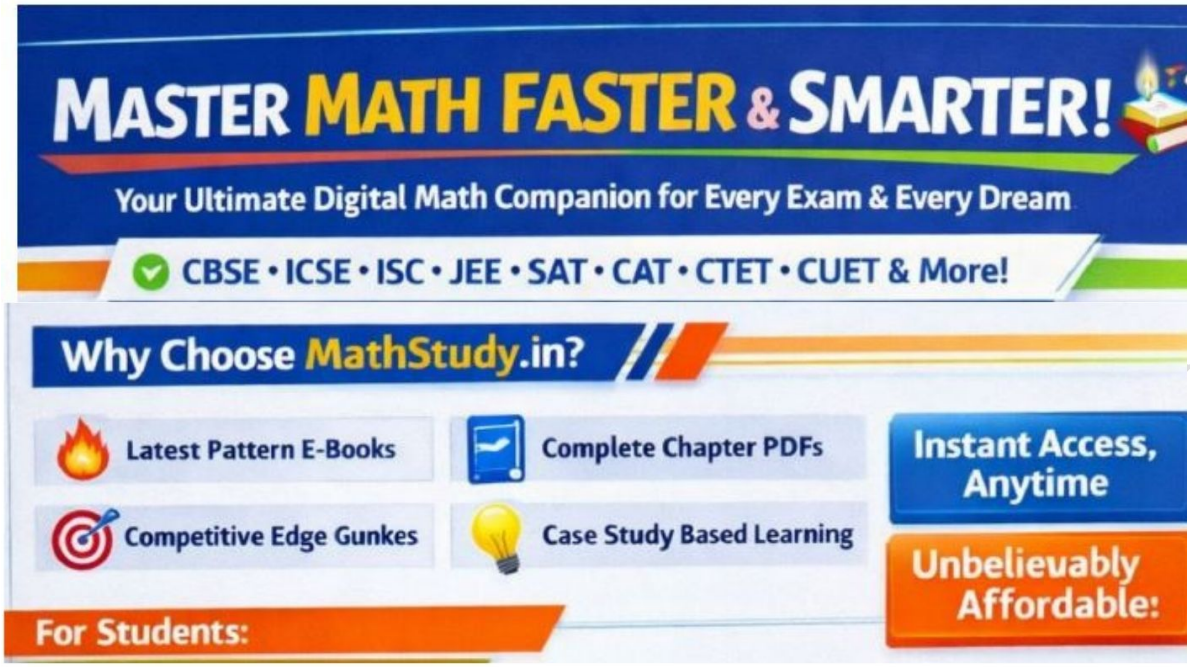

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Solutions

1. **Correct Option: (C)**. A measure derived from sample data is a statistic; a measure derived from population data is a parameter.

2. **Correct Option: (D)**. Even if a population is not normal, the sampling distribution becomes normal as n increases (usually $n \geq 30$).

3. **Correct Option: (C)**. For a one-sample t-test, $df = n - 1$.

4. **Correct Option: (B)**. The t-test is used when the population standard deviation (σ) is unknown and the sample size is small.

5. **Correct Option: (C)**. For independent samples, $df = n_1 + n_2 - 2$. Thus, $10 + 12 - 2 = 20$.

6. **Correct Option: (B)**. Standard Error (SE) is defined as the standard deviation of the sampling distribution: $\sigma/\sqrt{n}$.

7. **Correct Option: (C)**. The $\neq$ symbol in H_a indicates we are looking for differences in both directions.

8. **Correct Option: (C)**. The t-distribution is symmetric and bell-shaped, centered at zero.

9. **Correct Option: (C)**. As sample size (and degrees of freedom) grows, the t-distribution curve matches the Z-distribution.

10. **Correct Option: (A)**. $t = \frac{\bar{x}-\mu}{s/\sqrt{n}} \implies 2 = \frac{42-\mu}{4/4} \implies 2 = 42 - \mu \implies \mu = 40$.

11. **Correct Option: (B)**. Sampling error is the natural discrepancy between sample results and population reality.

12. **Correct Option: (B)**. H_0 usually assumes no difference between the groups being tested ($\mu_1 = \mu_2$).

13. **Correct Option: (B)**. If the test statistic exceeds the critical boundary, the result is statistically significant.

14. **Correct Option: (C)**. The mean of the sampling distribution of the mean ($\mu_{\bar{x}}$) is always equal to the population mean μ.

15. **Correct Option: (A)**. This represents the number of standard errors the sample mean is away from the hypothesized mean.

16. **Correct Option: (A)**. It allows for the use of parametric tests on non-normal populations provided n is sufficiently large.

17. **Correct Option: (C)**. Parameters describe populations; symbols like μ and σ represent parameters.

18. **Correct Option: (B)**. In a two-tailed test, the total α (rejection area) is split into two halves ($0.05/2 = 0.025$).

19. **Correct Option: (C)**. With very high degrees of freedom, critical values for t and Z become virtually identical.

20. **Correct Option: (C)**. $df = 15 + 15 - 2 = 28$.