

STA 250 PROBABILITY and STATISTICS

FINAL EXAM

12.06.2021

* The probability function of X random variable is given as,

$$f(x) = cx^2, D_X = \{-1, 1, 2\}$$

1. $c = ?$

2. $P(0 < X \leq 2) = ?$

3. $Var(X) = ?$

* The probability density function of X random variable is given as;

$$f(x) = \begin{cases} cx^2, & \dots - 2 \leq x \leq 2 \\ 0, & \dots o.w \end{cases}$$

4. $c = ?$

5. $P(0 < X < 1/2) = ?$

6. $Var(X) = ?$

*** It is known that;**

The resistance of the particular type of a resistance wires is normal random variable.

$$X \sim N(\mu = 40, \sigma^2 = 9)$$

A randomly selected resistance wire; obtain the probabilities

7. $P(46 < X < 49) = ?$

8. $P(38 < X < 44) = ?$

9. $P(X < 38) = ?$

10. $P(36 < X < 38) = ?$

11. $P(X > 41) = ?$

12. $P(Z > b) = 0.0158$, $b = ?$

*In a research report, Richard H. Weindruch of the UCLA Medical School claims that mice with an average life span of **32** months will live to be about 40 months old when 40% of the calories in their diet are replaced by vitamins and protein. Is there any reason to believe that $\mu > 40$ if $n = 60$ mice that are placed on this diet have an average life of $\bar{x} = 35$ months with a standard deviation $s = 5.8$ months? $\alpha = 0.05$

13. Write the calculated value.

14. Write the table value.

15. Decision criteria:

16. Decision : H_0

17. Two sided confidence interval :

$$P(\dots \leq \mu \leq \dots) = 0.95$$

*An electrical firm manufactures light bulbs that have a lifetime that is approximately normally distributed with a mean of **800** hours and a standard deviation of **40** hours $X \sim N(\mu = 800, \sigma = 40)$

Test the hypothesis that $H_0: \mu = 800$ hours against the alternative, $H_1: \mu \neq 800$ hours, if a random sample of $n = 40$ bulbs has an average life of $\bar{x} = 788$ hours. Obtain the confidence interval. $\alpha = 0.01$

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18. . Write the calculated value.

19. Write the table value.

20. Decision criteria:

21. Decision: H_0

22. Two sided confidence interval :

$$P(\dots \leq \mu \leq \dots) = 0.99$$

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$$X_i: 61, 66, 68, 72, 75, 33, 29, 51, 56, 90, 100, 75, 98$$

For this sample;

23. $S^2 = ?$

24. *median* = ?

25. A dice is tossed. The success : The surface point is 7 . Write the X random variable with its notation and probability.