Assignment 11

The due date for submitting this assignment has passed. Due on 2019-04-17, 23:59 IST.
As per our records you have not submitted this assignment.

1) Let \( X_1, \ldots, X_n \) be a random sample from \( N(0, \sigma^2) \), where \( \sigma^2 \) is an unknown. The MP test \( H_1 : \sigma^2 = \sigma_0^2 \) vs. \( H_2 : \sigma^2 > \sigma_0^2 \) is

   \[
   \text{a. Reject } H_1 \text{ if } \frac{\sum X_i^2}{\sigma_0^2} \geq \chi^2_{n, \alpha} \\
   \text{b. Reject } H_1 \text{ if } \frac{\sum X_i^2}{\sigma_0^2} \leq \chi^2_{n, \alpha} \\
   \text{c. Reject } H_1 \text{ if } \frac{\sum X_i^2}{\sigma_0^2} \geq \chi^2_{n, 1-\alpha} \\
   \text{d. Reject } H_1 \text{ if } \frac{\sum X_i^2}{\sigma_0^2} \leq \chi^2_{n, 1-\alpha}
   \]

   No, the answer is incorrect.
   Score: 0
   Accepted Answers:
   \( a. \)
3) In testing a hypothesis $H_1$ against an alternative $K_1$, the probability of type I error is defined as:

- $P(\text{Rejecting } H_1 \text{ when } H_1 \text{ is true})$
- $P(\text{Rejecting } H_1 \text{ when } K_1 \text{ is true})$
- $P(\text{Accepting } H_1 \text{ when } H_1 \text{ is true})$
- $P(\text{Accepting } H_1 \text{ when } K_1 \text{ is true})$

No, the answer is incorrect.
Score: 0
Accepted Answers:

4) Let the null hypothesis be that the alleged culprit is innocent and the alternative hypothesis that he/she is criminal. If the judge wrongly pronounces the alleged culprit to be criminal, the error committed by the judge is:

- Type I error
- Type II error
- Sampling error
- None of the above

No, the answer is incorrect.
Score: 0
Accepted Answers:

5) Let $X_1, \ldots, X_n$ be a random sample from a $N(\mu, 1)$ population. Consider the hypothesis $H_1: \mu = \mu_0$ vs. $K_1: \mu = \mu_1$, where $\mu_1 > \mu_0$. The MP test at level $\alpha = 0.05$ is to Reject $H_1$ if:

- $\bar{X} \leq \mu_0 + \frac{1.64}{\sqrt{n}}$
- $\bar{X} \geq \mu_0 + \frac{1.96}{\sqrt{n}}$
- $\bar{X} \leq \mu_0 + \frac{1.96}{\sqrt{n}}$
- $\bar{X} \geq \mu_0 + \frac{1.64}{\sqrt{n}}$

No, the answer is incorrect.
Score: 0
Accepted Answers:
Let \( X_1, \ldots, X_n \) be a random sample from an exponential distribution

\[
f(x, \theta) = \begin{cases} \theta e^{-\theta x}, & x \geq 0, \theta > 0 \\ 0, & \text{otherwise} \end{cases}
\]

Consider the hypothesis \( H_0 : \theta = 1 \) vs. \( H_1 : \theta = 2 \). Then the MP test is: Reject \( H_0 \) if

\[2 \sum_{i=1}^{n} X_i \geq \chi^2_{n,2}\]

\[2 \sum_{i=1}^{n} X_i \leq \chi^2_{n,1}\]

\[2 \sum_{i=1}^{n} X_i \geq \chi^2_{n,1}\]

\[2 \sum_{i=1}^{n} X_i \leq \chi^2_{n,2}\]

7) Which among the following is always a correct statement?

\[\text{a. Power increases then Type I error decreases.} \]
\[\text{b. Power increases then Type II error decreases.} \]
\[\text{c. Power decreases then Type I error decreases} \]
\[\text{d. Power decreases then Type II error decreases} \]

8)
Let \( X \) be a single observation from the population

\[
f(x, \theta) = \begin{cases} \theta e^{-\theta x}, & x \geq 0, \theta > 0 \\ 0, & \text{otherwise} \end{cases}
\]

If \( X > 1 \) is a critical region for testing \( H_0 : \theta = 1 \) vs. \( H_1 : \theta = 2 \), find the Type I error.

\[
a. \quad e \\
b. \quad e - 1 \\
c. \quad 1 - e \\
d. \quad e^{-1}
\]

No, the answer is incorrect.
Score: 0
Accepted Answers: 
\( d \)

9) In Question 8, find the power of test.

\[
a. \quad e^{-1} \\
b. \quad e^{-2} \\
c. \quad 2e^{-2} \\
d. \quad 1 - e^{-2}
\]

No, the answer is incorrect.
Score: 0
Accepted Answers: 
\( b \)

10) Let \( X \sim \text{Bin}(n, p) \), where \( p \) is known and \( 0 < p < 1 \). In order to test \( H_0 : p = \frac{1}{2} \) vs. \( H_1 : p = \frac{3}{4} \), a test is: \text{Reject } H_0 \text{ if } X \geq 2. \text{ Find the power of the test.}

\[
a. \quad \frac{1 + 3n}{4^n} \\
b. \quad \frac{1 - 3n}{4^n} \\
c. \quad 1 - \left( \frac{1 + 3n}{4^n} \right) \\
d. \quad 1 - \left( \frac{1 - 3n}{4^n} \right)
\]
a. 
b. 
c. 
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
c.