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3. Simple Testing

Let $X_1, \ldots, X_n$ be i.i.d. $\mathcal{N}(\theta, 1)$. Consider testing

$$H_0 : \theta = 0 \quad \text{v.s.} \quad H_1 : \theta = 1.$$

(a)

2/2 points (graded)

What would a Type 1 error be in this test?

- (●) Rejecting H_0 when $\theta = 0$
- ( ) Not Rejecting H_0 when $\theta = 0$
- ( ) Rejecting H_0 when $\theta = 1$

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Not rejecting H_0 when $\theta = 1$

✔

What would a Type 2 error be in this test?

Rejecting H_0 when $\theta = 0$

Not Rejecting H_0 when $\theta = 0$

Rejecting H_0 when $\theta = 1$

Not rejecting H_0 when $\theta = 1$

✔

Submit You have used 1 of 1 attempt

(b)

1/1 point (graded)

Suppose that the rejection region of a test ψ has the form $R = \{\overline{X}_n : \overline{X}_n > c\}$. Find the smallest c such that ψ has level α.

(If applicable, type **abs(x)** for $|x|$, **Phi(x)** for $\Phi(x) = \mathbf{P}(Z \leq x)$ where $Z \sim \mathcal{N}(0,1)$, and **q(alpha)** for q_α, the $1-\alpha$ quantile of a standard normal variable.)

$c \geq$ q(alpha)/sqrt(n) ✔

STANDARD NOTATION

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✔ Correct (1/1 point)

(c)

2/2 points (graded)

Suppose that the test ψ has level $\alpha = 0.05$. What is the power of ψ?

(If applicable, type **abs(x)** for $|x|$, **Phi(x)** for $\Phi(x) = \mathbf{P}(Z \leq x)$ where $Z \sim \mathcal{N}(0,1)$, and **q(alpha)** for q_α, the $1-\alpha$ quantile of a standard normal variable, e.g. enter **q(0.01)** for $q_{0.01}$.)

Power of ψ: 1-Phi(q(0.05)-sqrt(n)) ✔

What does the power of ψ approach as $n \to \infty$?

$\lim_{n\to\infty} \text{Power} =$ 1 ✔

STANDARD NOTATION

Submit You have used 1 of 3 attempts

✔ Correct (2/2 points)

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which test statistics in 3-c

question posted a day ago by **denizstij**

i am not sure exactly which test's power we need to estimate in 3-c. is it test of:

1) $H_0 : \theta = 0; H_1 : \theta = 1 => \psi = \mathbf{1}\{|\overline{X}_n| > s\}$ the test mentioned 3-a (i assume)

2) $\psi = \mathbf{1}\{\overline{X}_n > c\}$; namely the test mentioned in 3-b

as far as i see, 3-a and 3-b imply different tests. or is my understanding wrong; namely both tests are same in 3-a and 3-b ?

if my approach is wrong, any hint on 3-c please?

Thanks

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1 response

samc1031
a day ago

Part (a) does not specify a rejection region (the answers for that part don't depend on what that region is)

you are right... rejection region of 3-b worked... thanks ...

posted a day ago by **denizstij**

Hi @denizstij, would you please mark @samc1031's answer with a green check? This will help us navigate the forum more efficiently!

posted about 23 hours ago by **ya_mukhin** (Staff)

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