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reviewer2@nptel.iitm.ac.in ▼

Courses » Applied Time-Series Analysis

Announcements Course Ask a Question Progress

Unit 14 - Week 9: Estimation Theory

Week 9 Assignment

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2018-03-31, 23:59 IST

1) *1 point*

1. If $v[k] = c + e[k]$, where $e[k] \sim \mathcal{N}(0, \sigma_e^2)$ then the statistically *unbiased* least s estimate of the variance of $v[k]$ with N is _____

a. $\frac{1}{N^2}\sum_{k=1}^{N}(v[k] - \frac{1}{N}\sum_{k=1}^{N}v[k])^2$

b. $\frac{1}{N}\sum_{k=1}^{N}(v[k] - \frac{1}{N}\sum_{k=1}^{N}v[k])^2$

c. $\frac{1}{N-1}\sum_{k=1}^{N}(v[k] - \frac{1}{N}\sum_{k=1}^{N}v[k])^2$

d. $\frac{1}{N+1}\sum_{k=1}^{N}(v[k] - \frac{1}{N}\sum_{k=1}^{N}v[k])^2$

- a
- b
- c
- d

No, the answer is incorrect.
Score: 0

Accepted Answers:
c

2) *1 point*

2. The standard deviation for two different Gaussian, independent random processes and $e_2[k]$ are known to be σ_1 and σ_2 respectively. In order to obtain equal amo information about mean for both the processes the ratio of the data points $\frac{N_1}{N_2}$ sho _____.

a. $\frac{\sigma_1}{\sigma_2}$.

b. $\frac{\sigma_1^2}{\sigma_2^2}$.

c. $\frac{\sigma_1\sigma_2}{\sigma_2^2}$.

d. $\frac{\sigma_1\sigma_2}{\sigma_1^2}$.

- a
- b
- c
- d

No, the answer is incorrect.
Score: 0

Accepted Answers:
b

3) *1 point*

3. If $v[k]$ is a white noise process with exponential distribution $f(v[k]=x)=\lambda e^{-\lambda x}$ t N observations of $v[k]$ choose the right option(s).

   a. There exists a $\tilde{\lambda}$ s.t. $\sigma^2_{\tilde{\lambda}} = I^{-1}(\tilde{\lambda})$, $\tilde{\lambda} = \frac{1}{N}\sum_{k=1}^{N} v[k]$

   b. There exists a $\tilde{\lambda}\frac{1}{\tilde{\lambda}}$ s.t. $\sigma^2_{\frac{1}{\tilde{\lambda}}} = I^{-1}(\frac{1}{\tilde{\lambda}})$, $\frac{1}{\tilde{\lambda}} = \frac{1}{N}\sum_{k=1}^{N} v[k]$

   c. There exists a $\tilde{\lambda}\tilde{\lambda}$ s.t. $\sigma^2_{\tilde{\lambda}} = I^{-1}(\tilde{\lambda})$, $\tilde{\lambda} = \frac{N}{\sum_{k=1}^{N} v[k]}$

   d. None of these.

   where $I(\theta)$ and $\tilde{\theta}$ are the Fisher's Information and estimator of θ respectively.

a
b
c
d

No, the answer is incorrect.
Score: 0

Accepted Answers:
b

4) *1 point*

4. Given the data generating process

$$v[k] = 0.6e[k-1] + e[k]$$

use Monte-Carlo simulations and report the variance of the sample variance estimat Use $R = 10^5$ realizations with $N = 100$ observations per realization and round o answer to 2 decimal places.

   a. 0.5
   b. 0.05
   c. 1
   d. None of these.

a
b
c
d

No, the answer is incorrect.
Score: 0

Accepted Answers:
b

5) *1 point*

5. You are the visiting quality inspector of a sport equipment manufacturer. The manuf has developed a new, synthetic fishing line that they claim has a mean breaking st of 8 kg, with a standard deviation of 0.5. You decide to test this claim by randomly 50 fishing lines. You find that the mean breaking strength calculated from this sa 7.85 kg. At a level of 0.05, would you reject the claim that the manufacturer has m

   a. Yes
   b. No

a
b

No, the answer is incorrect.
Score: 0

Accepted Answers:
a

6) *1 point*

6. The lower bound for the variance of an unbiased estimator of $f(\theta)$: a function of a parameter θ is

a. $\frac{(f'(\theta))^2}{I(\theta)}$

b. $\frac{(f(\theta))^2}{I(\theta)}$

c. $\frac{I(\theta)}{(f'(\theta))^2}$

d. $\frac{I(\theta)}{(f(\theta))^2}$

- a
- b
- c
- d

No, the answer is incorrect.
Score: 0

Accepted Answers:
a

7) *1 point*

7. If the point estimates of mean for a random process $v[k]$ using two different estim from an N point dataset are obtained as $\bar{v_1} = \frac{1}{N}\sum_{k=1}^{N} v[k]$ and $\bar{v_2} = \frac{1}{N-p}\sum_{k=1}^{N} v[$ respectively, where $p > 0$ choose the correct option(s).

a. $\bar{v_1}$ is statistically and asymptotically unbiased, $\bar{v_2}$ is asymptotically unbiased.

b. $\bar{v_1}$ is asymptotically unbiased, $\bar{v_2}$ is statistically biased.

c. $\bar{v_1}$ is asymptotically unbiased, $\bar{v_2}$ is statistically unbiased.

d. $\bar{v_1}$ is statistically biased , $\bar{v_2}$ is asymptotically unbiased.

- a
- b
- c
- d

No, the answer is incorrect.
Score: 0

Accepted Answers:
a
b

8) *1 point*

8. Given three observations $v[1]$, $v[2]$ and $v[3]$ of a series, the maximum order p of process of the form $v[k] = \sum_{i=1}^{p} d_i v[k-i] + e[k]$ that can be fit and the least squ estimates of the corresponding parameters are obtained as _____.

a. $p = 1,\ d_1 = \frac{v[1]}{v[2]}$

b. $p = 2,\ d_1 = \frac{v[1]}{v[2]},\ d_2 = \frac{v[3]}{v[2]}$

c. $p = 2,\ d_1 = -\frac{v[1]^2}{v[2]},\ d_2 = \frac{v[3]}{v[2]}$

d. $p = 1,\ d_1 = \frac{v[1]v[2] + v[2]v[3]}{v^2[1] + v^2[2]}$

- a
- b
- c
- d

No, the answer is incorrect.
Score: 0

Accepted Answers:
d

9) *1 point*

9. Consider the data in the table given below:

y	198.97	243.02	296.83	362.54	442.81	540.85	660.60	806.8
x	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3

Suppose you are given the predictor expression for y as

$$\hat{y} = ae^{bx}$$

obtain an estimate of a using linear least squares (round off your answer to 2 dec places)_____.

a. 2.26
b. 1.5
c. 1.65
d. 1.83

- a
- b
- c
- d

No, the answer is incorrect.
Score: 0

Accepted Answers:
d

10) *1 point*

10. The data given in `w9_q10.RData` is generated by mixing deterministic and random with the model structure given below:

$$y[k] = ax[k] + w[k]$$

$$w[k] = be[k-1] + e[k]$$

where $e[k] \sim \mathcal{N}(0, \sigma_e^2)$. Using R, find the values of $\hat{a}$ and $\hat{b}$.

a. $\hat{a} = 0.5570, \hat{b} = 0.5864$
b. $\hat{a} = 0.5714, \hat{b} = 0.5544$
c. $\hat{a} = 0.5874, \hat{b} = 0.5138$
d. $\hat{a} = 0.5930, \hat{b} = 0.5064$

- a
- b
- c
- d

No, the answer is incorrect.
Score: 0

Accepted Answers:
a

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