Started on	Friday, 6 October 2023, 10:50 PM
State	Finished
Completed on	Friday, 6 October 2023, 11:15 PM
Time taken	24 mins 26 secs
Grade	**10.00** out of 10.00 (**100**%)

Question **1**

Correct

Mark 1.00 out of 1.00

Flag question

Let X be a Gaussian RV with mean 2 and variance 2. Its PDF is given as

Select one:

- $\frac{1}{\sqrt{4\pi}} e^{\frac{(x-2)^2}{8}}$
- $\frac{1}{\sqrt{4\pi}} e^{-\frac{(x-2)^2}{4}}$ ✔
- $\frac{1}{\sqrt{8\pi}} e^{-\frac{(x-2)^2}{8}}$
- $\frac{1}{\sqrt{8\pi}} e^{-\frac{(x-2)^2}{4}}$

Your answer is correct.

The correct answer is: $\frac{1}{\sqrt{4\pi}} e^{-\frac{(x-2)^2}{4}}$

Question **2**

Correct

Mark 1.00 out of 1.00

Flag question

The unknown quantity that is to be estimated is termed the

Select one:

- Variable
- Gaussian
- Random
- Parameter ✔

Your answer is correct.

The correct answer is: Parameter

Question **3**

Correct

Mark 1.00 out of 1.00

Flag question

In the context of estimation, the probability density function (PDF) of the observations, viewed as a function of the unknown parameter *h* is termed as the

Select one:

- Objective Function
- Cost Function
- Estimation Function
- Likelihood Function ✔

Your answer is correct.

The correct answer is: Likelihood Function

Question **4**

Correct

Mark 1.00 out of 1.00

Flag question

Consider the wireless sensor network (WSN) estimation scenario described in lectures with each observation $y(k) = h + v(k)$, for $1 \leq k \leq N$, i.e. number of observations is N and i.i.d. real Gaussian noise samples of variance σ^2. The parameter h is deterministic and unknown. The distribution of $y(k)$ is

Select one:

- Gaussian with mean 0 and variance σ^2
- Exponential with mean 0 and variance σ^2
- Gaussian with mean h and variance σ^2 ✔
- Laplacian with mean h and variance σ^2

Your answer is correct.

The correct answer is: Gaussian with mean h and variance σ^2

Question **5**

Correct

Mark 1.00 out of 1.00

Flag question

Consider the wireless sensor network (WSN) estimation scenario described in lectures with each observation $y(k) = h + v(k)$, for $1 \leq k \leq N$, i.e. number of observations is N and i.i.d. real Gaussian noise samples of variance σ^2. The likelihood $p(\bar{\mathbf{y}}; h)$ of the parameter h, where $\bar{\mathbf{y}} = [y(1) \quad y(2) \quad \ldots \quad y(N)]^T$ is

Select one:

- $\left(\frac{1}{2\pi\sigma^2}\right)^{\frac{N}{2}} e^{-\frac{1}{2\sigma^2}\sum_{k=1}^{N}(y(k)-h)^2}$ ✔
- $\left(\frac{1}{2\pi\sigma^2}\right)^{\frac{N}{2}} e^{-\frac{1}{2\sigma^2}\sum_{k=1}^{N}(y(k)-h)}$

- $\left(\frac{1}{2\pi\sigma^2}\right)^{\frac{N}{2}} e^{-\frac{1}{2\sigma^2}\sum_{k=1}^{N}|y(k)-h|}$
- $\left(\frac{1}{2\pi\sigma^2}\right)^{\frac{N}{2}} e^{-\frac{1}{2\sigma^2}\left(\sum_{k=1}^{N} y(k)-h\right)^2}$

Your answer is correct.

The correct answer is: $\left(\frac{1}{2\pi\sigma^2}\right)^{\frac{N}{2}} e^{-\frac{1}{2\sigma^2}\sum_{k=1}^{N}(y(k)-h)^2}$

Question **6**

Correct

Mark 1.00 out of 1.00

Flag question

Consider the wireless sensor network (WSN) estimation scenario described in lectures with each observation $y(k) = h + v(k)$, for $1 \leq k \leq N$, i.e. number of observations is N and i.i.d. real Gaussian noise samples of variance σ^2. As the number of samples N increases, the spread of estimate around the true parameter

Select one:

- Increases
- Remains constant
- Decreases ✔
- Cannot be determined

Your answer is correct.

The correct answer is: Decreases

Question **7**

Correct

Mark 1.00 out of 1.00

Flag question

Consider the wireless sensor network (WSN) estimation scenario described in lectures with each observation $y(k) = h + v(k)$, for $1 \leq k \leq N$, i.e. number of observations is N. The ML estimate given by the sample mean has the following property.

Select one:

- It is unbiased
- Gaussian distributed
- All of the these ✔
- Variance decreases as *1/N* where *N* is number of observations

Your answer is correct.

The correct answer is: All of the these

Question **8**

Correct

Mark 1.00 out of 1.00

Flag question

Consider the wireless sensor network (WSN) estimation scenario described in lectures with each observation $y(k) = h + v(k)$, for $1 \leq k \leq 4$, with the observations given as $y(1) = -1,\ y(2) = -2,\ y(3) = 1,\ y(4) = 3$. What is the maximum likelihood estimate $\hat{h}$ of the unknown parameter h ?

Select one:

- -1/4
- 3/4
- 1/4 ✔
- -3/2

Your answer is correct.

The correct answer is: 1/4

Question **9**

Correct

Mark 1.00 out of 1.00

Flag question

Consider the wireless sensor network (WSN) estimation scenario described in lectures with each observation $y(k) = h + v(k)$, for $1 \leq k \leq 4$. What is the mean of the maximum likelihood estimate $\hat{h}$ of the unknown parameter h ?

Select one:

- $\frac{1}{2}h$
- h ✔
- $\frac{1}{4}h$
- $-\frac{1}{4}h$

Your answer is correct.

The correct answer is: h

Question **10**

Correct

Mark 1.00 out of 1.00

Flag question

Consider the wireless sensor network (WSN) estimation scenario described in lectures with each observation $y(k) = h + v(k)$, for $1 \leq k \leq 4$, i.e. number of observations $N = 4$ and IID Gaussian noise samples of variance $\sigma^2 = 4$. What is the variance of the maximum likelihood estimate $\hat{h}$ of the unknown parameter h ?

Select one:

- 1/2
- 1/4
- 1 ✔
- 1/8

Your answer is correct.

The correct answer is: 1

Finish review