Started on	Sunday, 8 October 2023, 6:03 PM
State	Finished
Completed on	Sunday, 8 October 2023, 6:38 PM
Time taken	35 mins 22 secs
Grade	**10.00** out of 10.00 (**100**%)

Question **1**

Correct

Mark 1.00 out of 1.00

⚑ Flag question

Concepts of detection theory can be used

Select one:

○ Only in Wireless Technology

◉ All of these ✔

○ Only in RADAR

○ Only in Machine Learning

Your answer is correct.

The correct answer is:
All of these

Question **2**

Correct

Mark 1.00 out of 1.00

⚑ Flag question

The general problem in detection is

Select one:

○ Multiple cost determination

◉ Binary hypothesis testing ✔

○ Gaussian discriminant analysis

○ Optimal pattern recognition

Your answer is correct.

The correct answer is: Binary hypothesis testing

Question **3**

Correct

Mark 1.00 out of 1.00

⚑ Flag question

Consider the binary hypothesis testing problem described in lectures with noise variance 4. The distribution of the output under H_0 is

Select one:

○ $\mathcal{N}(0, 2\mathbf{I})$

○ $\mathcal{N}(\bar{s}, 2\mathbf{I})$

○ $\mathcal{N}(\bar{s}, 4\mathbf{I})$

◉ $\mathcal{N}(0, 4\mathbf{I})$ ✔

Your answer is correct.

The correct answer is: $\mathcal{N}(0, 4\mathbf{I})$

Question **4**

Correct

Mark 1.00 out of 1.00

⚑ Flag question

Consider the binary hypothesis testing problem described in lectures with noise variance 1. The distribution of the output under H_1 is

Select one:

◉ $\mathcal{N}(\bar{s}, \mathbf{I})$ ✔

○ $\mathcal{N}(0, \mathbf{I})$

○ $\mathcal{N}(0, 2\mathbf{I})$

○ $\mathcal{N}(\bar{s}, 2\mathbf{I})$

Your answer is correct.

The correct answer is: $\mathcal{N}(\bar{s}, \mathbf{I})$

Question **5**

Correct

Mark 1.00 out of 1.00

⚑ Flag question

Consider the binary hypothesis testing problem described in lectures with noise variance σ^2. The likelihood of H_0 is

Select one:

○ $\left(\dfrac{1}{2\pi\sigma^2}\right)^{\frac{N}{2}} e^{-\frac{\sum_{i=1}^{N} y(i)}{2\sigma^2}}$

○ $\left(\dfrac{1}{2\pi\sigma^2}\right)^{\frac{N}{2}} e^{-\frac{\left(\sum_{i=0}^{N} y(i)-s(i)\right)^2}{2\sigma^2}}$

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

○ $\left(\dfrac{1}{2\pi\sigma^2}\right)^{\frac{N}{2}} e^{-\frac{\sum_{i=0}^{N}\left(y(i)-s(i)\right)^2}{2\sigma^2}}$

Your answer is correct.

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

Question **6**

Correct

Mark 1.00 out of 1.00

⚐ Flag question

Consider the binary hypothesis testing problem described in lectures with noise variance σ^2. The likelihood of H_1 is

Select one:

○ $\left(\dfrac{1}{2\pi\sigma^2}\right)^{\frac{N}{2}} e^{-\frac{\sum_{i=1}^{N} y(i)}{2\sigma^2}}$

○ $\left(\dfrac{1}{2\pi\sigma^2}\right)^{\frac{N}{2}} e^{-\frac{\left(\sum_{i=0}^{N} y(i) - s(i)\right)^2}{2\sigma^2}}$

○ $\left(\dfrac{1}{2\pi\sigma^2}\right)^{\frac{N}{2}} e^{-\frac{\sum_{i=1}^{N} y^2(i)}{2\sigma^2}}$

◉ $\left(\dfrac{1}{2\pi\sigma^2}\right)^{\frac{N}{2}} e^{-\frac{\sum_{i=0}^{N} \left(y(i) - s(i)\right)^2}{2\sigma^2}}$ ✔

Your answer is correct.

The correct answer is: $\left(\dfrac{1}{2\pi\sigma^2}\right)^{\frac{N}{2}} e^{-\frac{\sum_{i=0}^{N} \left(y(i) - s(i)\right)^2}{2\sigma^2}}$

Question **7**

Correct

Mark 1.00 out of 1.00

⚐ Flag question

The principal tool in detection is

Select one:

○ Maximum Likelihood

◉ Likelihood Ratio Test ✔

○ Maximum Aposteriori Probability

○ Minimum Mean Squared Error

Your answer is correct.

The correct answer is: Likelihood Ratio Test

Question **8**

Correct

Mark 1.00 out of 1.00

⚐ Flag question

The LRT chooses H_0 if

Select one:

○ $\frac{p(\bar{y};\mathcal{H}_0)}{p(\bar{y};\mathcal{H}_1)} \geq \tilde{\gamma}$ ✔

○ $\frac{p(\bar{y};\mathcal{H}_0)}{p(\bar{y};\mathcal{H}_1)} \geq 1$

○ $\frac{p(\bar{y};\mathcal{H}_0)}{p(\bar{y};\mathcal{H}_1)} < \tilde{\gamma}$

○ $\frac{p(\bar{y};\mathcal{H}_0)}{p(\bar{y};\mathcal{H}_1)} < 1$

Your answer is correct.

The correct answer is: $\frac{p(\bar{y};\mathcal{H}_0)}{p(\bar{y};\mathcal{H}_1)} \geq \tilde{\gamma}$

Question **9**

Correct

Mark 1.00 out of 1.00

⚑ Flag question

The LRT for the signal detection problem reduces to choose H_0 if

Select one:

○ $\bar{s}^T\bar{y} \leq \gamma$ ✔

○ $\bar{s}^T\bar{y} > \gamma$

○ $\bar{s}^T\bar{y} \leq 1$

○ $\bar{s}^T\bar{y} > 1$

Your answer is correct.

The correct answer is: $\bar{s}^T\bar{y} \leq \gamma$

Question **10**

Correct

Mark 1.00 out of 1.00

⚑ Flag question

The LRT reduces to the ML decision rule for $\gamma =$

Select one:

○ $\|\bar{s}\|^2$

○ $\frac{\|\bar{s}\|^2}{2}$ ✔

○ $\|\bar{s}\|$

○ $\frac{\|\bar{s}\|^2}{4}$

Your answer is correct.

The correct answer is: $\dfrac{\|\bar{s}\|^2}{2}$