Started on	Saturday, 21 October 2023, 10:50 AM
State	Finished
Completed on	Saturday, 21 October 2023, 11:29 AM
Time taken	39 mins 14 secs
Grade	**9.00** out of 10.00 (**90**%)

Question **1**

Correct

Mark 1.00 out of 1.00

Flag question

The threshold γ for the ML detection in the signal detection problem is given as

Select one:

- $\|\bar{\mathbf{s}}\|^2$
- $2\|\bar{\mathbf{s}}\|^2$
- $\frac{\|\bar{\mathbf{s}}\|}{2}$
- $\frac{\|\bar{\mathbf{s}}\|^2}{2}$ ✔

Your answer is correct.

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

Question **2**

Correct

Mark 1.00 out of 1.00

Flag question

The probability of error for detection can be evaluated as

Select one:

- $\Pr(\mathcal{H}_0)\, P_{FA} + \Pr(\mathcal{H}_1)\, P_D$
- $\Pr(\mathcal{H}_0)\, P_{FA} + \Pr(\mathcal{H}_1)\, P_{MD}$ ✔
- $\Pr(\mathcal{H}_1)\, P_{FA} + \Pr(\mathcal{H}_0)\, P_D$
- $\Pr(\mathcal{H}_1)\, P_{FA} + \Pr(\mathcal{H}_0)\, P_{MD}$

Your answer is correct.

The correct answer is: $\Pr(\mathcal{H}_0)\, P_{FA} + \Pr(\mathcal{H}_1)\, P_{MD}$

Question **3**

Correct

Mark 1.00 out of 1.00

Flag question

The probability of error for the ML detector in the signal detection problem is

Select one:

- $Q\left(\frac{\|\bar{\mathbf{s}}\|}{\sigma}\right)$
- $Q\left(\frac{\|\bar{\mathbf{s}}\|}{2\sigma}\right)$ ✔
- $Q\left(\frac{2\|\bar{\mathbf{s}}\|}{\sigma}\right)$
- $Q\left(\frac{\|\bar{\mathbf{s}}\|^2}{2\sigma^2}\right)$

Your answer is correct.

The correct answer is: $Q\left(\frac{\|\bar{\mathbf{s}}\|}{2\sigma}\right)$

Question **4**

Correct

Consider the signal

Mark 1.00 out of 1.00

Flag question

$$\bar{\mathbf{s}} = \begin{bmatrix} 4 \\ 4 \\ -4 \\ -4 \end{bmatrix}$$

and noise variance $\sigma^2 = 3\ dB$. The probability of error of the ML detector is

Select one:

- $Q\left(\frac{1}{\sqrt{2}}\right)$
- $Q(\sqrt{2})$
- $Q(2\sqrt{2})$ ✔
- $Q\left(\frac{1}{4}\right)$

Your answer is correct.

The correct answer is: $Q(2\sqrt{2})$

Question **5**

Correct

Mark 1.00 out of 1.00

Flag question

For the Amplitude Shift Keying (ASK) constellation with

$\frac{E_b}{N_0} = 6\ dB$, the BER is given as

Select one:

- $Q(1)$
- $Q(\sqrt{2})$
- $Q(2)$ ✔
- $Q(2\sqrt{2})$

Your answer is correct.

The correct answer is: $Q(2)$

Question **6**

Correct

Mark 1.00 out of 1.00

Flag question

Let detector choose $\mathcal{H}_1$ when $\bar{\mathbf{y}} \in R_1$ and $\mathcal{H}_0$ when $\bar{\mathbf{y}} \in R_0$. The probability of detection is given as

Select one:

- $\int_{R_1} p(\bar{\mathbf{y}}; \mathcal{H}_1)\, d\bar{\mathbf{y}}$ ✔
- $\int_{R_1} p(\bar{\mathbf{y}}; \mathcal{H}_0)\, d\bar{\mathbf{y}}$
- $\int_{R_0} p(\bar{\mathbf{y}}; \mathcal{H}_1)\, d\bar{\mathbf{y}}$
- $\int_{R_0} p(\bar{\mathbf{y}}; \mathcal{H}_0)\, d\bar{\mathbf{y}}$

Your answer is correct.

The correct answer is: $\int_{R_1} p(\bar{\mathbf{y}}; \mathcal{H}_1)\, d\bar{\mathbf{y}}$

Question **7**

Correct

Let detector choose $\mathcal{H}_1$ when $\bar{\mathbf{y}} \in R_1$ and $\mathcal{H}_0$ when $\bar{\mathbf{y}} \in R_0$. The probability of false alarm is given as

Mark 1.00 out of 1.00

Flag question

Select one:

- $\int_{R_0} p(\bar{\mathbf{y}}; \mathcal{H}_1)\, d\bar{\mathbf{y}}$
- $\int_{R_1} p(\bar{\mathbf{y}}; \mathcal{H}_1)\, d\bar{\mathbf{y}}$
- $\int_{R_0} p(\bar{\mathbf{y}}; \mathcal{H}_0)\, d\bar{\mathbf{y}}$
- $\int_{R_1} p(\bar{\mathbf{y}}; \mathcal{H}_0)\, d\bar{\mathbf{y}}$ ✔

Your answer is correct.

The correct answer is: $\int_{R_1} p(\bar{\mathbf{y}}; \mathcal{H}_0)\, d\bar{\mathbf{y}}$

Question **8**

Incorrect

Mark 0.00 out of 1.00

Flag question

Let detector choose $\mathcal{H}_1$ when $\bar{\mathbf{y}} \in R_1$ and $\mathcal{H}_0$ when $\bar{\mathbf{y}} \in R_0$. We must have

Select one:

- $\int_{R_1} p(\bar{\mathbf{y}}; \mathcal{H}_0)\, d\bar{\mathbf{y}} + \int_{R_1} p(\bar{\mathbf{y}}; \mathcal{H}_1)\, d\bar{\mathbf{y}} = 1$
- $\int_{R_1} p(\bar{\mathbf{y}}; \mathcal{H}_0)\, d\bar{\mathbf{y}} + \int_{R_0} p(\bar{\mathbf{y}}; \mathcal{H}_1)\, d\bar{\mathbf{y}} = 1$
- $\int_{R_1} p(\bar{\mathbf{y}}; \mathcal{H}_0)\, d\bar{\mathbf{y}} + \int_{R_0} p(\bar{\mathbf{y}}; \mathcal{H}_0)\, d\bar{\mathbf{y}} = 1$
- $\int_{R_1} p(\bar{\mathbf{y}}; \mathcal{H}_1)\, d\bar{\mathbf{y}} + \int_{R_0} p(\bar{\mathbf{y}}; \mathcal{H}_0)\, d\bar{\mathbf{y}} = 1$ ✖

Your answer is incorrect.

The correct answer is: $\int_{R_1} p(\bar{\mathbf{y}}; \mathcal{H}_0)\, d\bar{\mathbf{y}} + \int_{R_0} p(\bar{\mathbf{y}}; \mathcal{H}_0)\, d\bar{\mathbf{y}} = 1$

Question **9**

Correct

Mark 1.00 out of 1.00

Flag question

The optimal detector

Select one:

- Maximizes sum of P_D and P_{FA}
- Maximizes both P_D and P_{FA}
- Maximizes P_D for a given P_{FA} ✔
- Minimizes P_D for a given P_{FA}

Your answer is correct.

The correct answer is: Maximizes P_D for a given P_{FA}

Question **10**

Correct

Mark 1.00 out of 1.00

Flag question

The optimal detector for the binary hypothesis testing according to the Neyman-Pearson (NP) criterion is given by the

Select one:

- Maximum Likelihood
- Likelihood Ratio Test ✔
- Minimum Mean Squared Error
- Maximum Aposteriori Probability Rule

Your answer is correct.

The correct answer is: Likelihood Ratio Test

Finish review