

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
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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

Mark 1.00 out of 1.00

🚩 Flag question

Consider the signal

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

and noise variance $\sigma^2 = 3 \text{ dB}$. 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

$\frac{E_b}{N_0} = 6 \text{ dB}$, 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 $\bar{y} \in R_1$ and \mathcal{H}_0 when $\bar{y} \in R_0$. The probability of detection is given as

Select one:

- ☒ $\int_{R_1} p(\bar{y}; \mathcal{H}_1) d\bar{y}$ ✓
- ☐ $\int_{R_1} p(\bar{y}; \mathcal{H}_0) d\bar{y}$
- ☐ $\int_{R_0} p(\bar{y}; \mathcal{H}_1) d\bar{y}$
- ☐ $\int_{R_0} p(\bar{y}; \mathcal{H}_0) d\bar{y}$

Your answer is correct.

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

Question **7**

Correct

Mark 1.00 out of 1.00

🚩 Flag question

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

Select one:

- ☐ $\int_{R_0} p(\bar{y}; \mathcal{H}_1) d\bar{y}$
- ☐ $\int_{R_1} p(\bar{y}; \mathcal{H}_1) d\bar{y}$
- ☐ $\int_{R_0} p(\bar{y}; \mathcal{H}_0) d\bar{y}$
- ☒ $\int_{R_1} p(\bar{y}; \mathcal{H}_0) d\bar{y}$ ✓

Your answer is correct.

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

Question **8**

Incorrect

Mark 0.00 out of 1.00

🚩 Flag question

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

Select one:

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

Your answer is incorrect.

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

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](#)