Assignment 2

The due date for submitting this assignment has passed. Due on 2017-02-07, 23:59 IST. As per our records you have not submitted this assignment.

1) Consider N mutually exclusive and exhaustive events $A_0, A_1, A_2, \ldots, A_{N-1}$ and another event $B$. From Bayes' theorem, the probability $P(A_i | B)$ is,

$$
\frac{P(B \cap A_i)}{\sum_{j=0}^{N-1} P(B \cap A_j)}
$$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$P(B \cap A_i) / \sum_{j=0}^{N-1} P(B \cap A_j)$

1.2) Consider a binary “asymmetric” channel with $P(A_0) = 0.15$, $P(B_1 | A_0) = 0.20$, $P(B_1 | A_1) = 0.75$. 1 point where $A_i, B_i$ denote the events corresponding to transmitted and received symbols $i \in \{0, 1\}$ at the transmitter and receiver respectively. Then, $P(A_1), P(B_0 | A_1)$ respectively are,

- 0.85, 0.80
- 0.15, 0.25
- 0.85, 0.25
- 0.15, 0.80

No, the answer is incorrect.
Score: 0

Accepted Answers:
0.85, 0.25
Consider a binary “asymmetric” channel with \( P(A_0) = 0.15, P(B_1|A_0) = 0.20, P(B_1|A_1) = 0.75 \), where \( A_i, B_i \) denote the events corresponding to transmitted and received symbols \( i \in \{0, 1\} \) at the transmitter and receiver respectively. Which of the following values correspond to a particular “likelihood” in this system?

- 0.15
- 0.85
- 0.70
- 0.80

No, the answer is incorrect.
Score: 0
Accepted Answers:
0.80

4) Consider a binary “asymmetric” channel with \( P(A_0) = 0.15, P(B_1|A_0) = 0.20, P(B_1|A_1) = 0.75 \), where \( A_i, B_i \) denote the events corresponding to transmitted and received symbols \( i \in \{0, 1\} \) at the transmitter and receiver respectively. What is the aposteriori probability \( P(A_0|B_0) \)?

- 0.46
- 0.36
- 0.66
- 0.56

No, the answer is incorrect.
Score: 0
Accepted Answers:
0.36

5) Consider a binary “asymmetric” channel with \( P(A_0) = 0.15, P(B_1|A_0) = 0.20, P(B_1|A_1) = 0.75 \), where \( A_i, B_i \) denote the events corresponding to transmitted and received symbols \( i \in \{0, 1\} \) at the transmitter and receiver respectively. What are the MAP estimates corresponding to the observations 0,1 respectively at the receiver?

- 0, 0
- 0, 1
- 1, 0
- 1, 1

No, the answer is incorrect.
Score: 0
Accepted Answers:
1, 1

6) Consider a binary “asymmetric” channel with \( P(A_0) = 0.15, P(B_1|A_0) = 0.20, P(B_1|A_1) = 0.75 \), where \( A_i, B_i \) denote the events corresponding to transmitted and received symbols \( i \in \{0, 1\} \) at the transmitter and receiver respectively. What is the probability of error for the MAP receiver?

- 0.15
- 0.24
- 0.20
- 0.28

No, the answer is incorrect.
Score: 0
Accepted Answers:
0.15

7) Consider a binary “asymmetric” channel with \( P(A_0) = 0.15, P(B_1|A_0) = 0.20, P(B_1|A_1) = 0.75 \), where \( A_i, B_i \) denote the events corresponding to transmitted and received symbols \( i \in \{0, 1\} \) at the transmitter and receiver respectively. What are the ML estimates corresponding to the observations 0,1 respectively at the receiver?
8) Consider the probability density function \( f_X(x) = K x^2 e^{(-x^2)} \) for \(-\infty \leq x \leq \infty\). 1 point
The value of constant K is,
- \(0,0\)
- \(0,1\)
- \(1,0\)
- \(1,1\)

No, the answer is incorrect.
Score: 0
Accepted Answers:
0,1

\[ f_X(x) = K x^2 e^{(-x^2)} \]
\[
\int_{-\infty}^{\infty} f_X(x) \, dx = 1
\]
\[
\int_{-\infty}^{\infty} K x^2 e^{(-x^2)} \, dx = 1
\]
\[
K \int_{-\infty}^{\infty} x^2 e^{(-x^2)} \, dx = 1
\]
\[
K \left( \frac{1}{\sqrt{\pi}} \right)^2 = 1
\]
\[
K = \frac{1}{\sqrt{\pi}}
\]

No, the answer is incorrect.
Score: 0
Accepted Answers:
\[ \frac{1}{\sqrt{\pi}} \]

9) Consider the probability density function \( f_X(x) = K x^2 e^{(-x^2)} \) for \(-\infty \leq x \leq \infty\). The mean of the random variable is
- \(1\)
- \(0.5\)
- \(\sqrt{\frac{2}{\pi}}\)
- \(0\)

No, the answer is incorrect.
Score: 0
Accepted Answers:
0

\( \mu = \int_{-\infty}^{\infty} x f_X(x) \, dx \)
\[
\int_{-\infty}^{\infty} x K x^2 e^{(-x^2)} \, dx \]
\[
K \int_{-\infty}^{\infty} x^3 e^{(-x^2)} \, dx
\]
\[
K \left( \frac{3}{\sqrt{\pi}} \right) = \mu
\]
\[
K \frac{3}{\sqrt{\pi}} = \mu
\]
\[
K = \frac{\mu}{\frac{3}{\sqrt{\pi}}}
\]
\[
K = \frac{\sqrt{\pi}}{3}
\]

No, the answer is incorrect.
Score: 0
Accepted Answers:
0

10) Consider the probability density function \( f_X(x) = K x^2 e^{(-x^2)} \) for \(-\infty \leq x \leq \infty\). 1 point
The variance of the random variable is,
- \(1.5\)
- \(2\)
- \(0.5\)
- \(3\)

No, the answer is incorrect.
Score: 0
Accepted Answers:
1.5