Assignment 4

The due date for submitting this assignment has passed. **Due on 2018-09-05, 23:59 IST.**

As per our records you have not submitted this assignment.

1) The signal \( s(t) \) is input to a matched filter with impulse response \( h(t) = s(T - t) \), where \( s(t) = A/2, t \in [0, T/2] \), \( s(t) = -A/2, t \in [T/2, T] \) and 0 other. The peak value of the output is

- \( A^2T/4 \)
- \( A^2T/3 \)
- \( A^2T \)
- \( A^2T/2 \)

No, the answer is incorrect.

Score: 0

Accepted Answers:

- \( A^2T/4 \)

2) A communication system uses antipodal signals \( s(t) \) and \(-s(t)\) for respective transmission of \( 1 \) point equiprobable binary symbols. The received signal is \( r(t) = \pm s(t) + n(t) \), where \( s(t) \) is the signal shown below and \( n(t) \) is additive zero-mean white Gaussian noise with power spectral density \( N_0/2 \) watts/hertz. What is the variance of the noise at the output of the matched filter with impulse response \( h(t) = s(3 - t) \), at \( t = 3 \)?

![Graph of s(t)](image-url)
3) For the optimum receiver, the probability of symbol error for the communication system in question 2, as a function of $A$ and $N_0$ is

- $Q(\sqrt{A^2/N_0})$
- $Q(\sqrt{2A^2/N_0})$
- $Q(\sqrt{4A^2/N_0})$
- $Q(\sqrt{A^2/2N_0})$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$Q(\sqrt{4A^2/N_0})$

4) Two equiprobable symbols are transmitted using signals $s_1(t)$ and $s_2(t)$ given below, over a zero-mean AWGN channel with noise power spectral density $N_0/2$. The signal $s_1(t) = At/T$, $t \in [0, T]$ and 0 otherwise. $s_2(t) = A\left(1 - \frac{t}{T}\right)$, $t \in [0, T]$, and 0 otherwise. The probability of symbol error for the optimum receiver in terms of $A$, $T$ and $N_0$ is

- $Q(\sqrt{A^2T/6N_0})$
- $Q(\sqrt{A^2T/3N_0})$
- $Q(\sqrt{A^2T/2N_0})$
- $Q(\sqrt{A^2T/4N_0})$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$Q(\sqrt{A^2T/6N_0})$

5) The input to a signal detector is of the form $r = \pm A + n$. The amplitudes $+A$ and $-A$ are equiprobable. The noise variable $n$ is distributed according to Laplacian pdf, $f(n) = \frac{1}{2\lambda} e^{-\lambda|n|}$. The expression for signal to noise ratio (SNR) in this case is $A^2\lambda^2/2$. The required SNR to achieve an error probability of $10^{-5}$ for the optimum receiver, approximately (in dB) is

- 9.6
- 11.6
No, the answer is incorrect.
Score: 0
Accepted Answers:
17.6