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NPTEL

reviewer3@nptel.iitm.ac.in ▾

Courses » Principles of Digital Communications

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Unit 4 - Week 3

Course outline

How to access the portal

Week 1

Week 2

Week 3

- Lecture 13 : Channel Capacity-III
- Lecture 14 : Channel Capacity-IV
- Lecture 15 : Summary of Information Theory
- Lecture 16 : Signal Space Representation-I
- Lecture 17 : Signal Space Representations-II
- Quiz : Assignment 3
- Download Videos
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- Assignment 3 - Solutions

Assignment 3

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment. **Due on 2018-09-05, 23:59 IST.**

1) A pixel of 3×10^5 pixels of black-and-white television image can occupy one of 10 different brightness levels with uniform probability. If the rate of transmission is 30 image frames per second and signal to noise ratio is $30dB$, then the minimum bandwidth required of the communication channel for error free transmission in kHz is

No, the answer is incorrect.
Score: 0

Accepted Answers:
(Type: Numeric) 3

0 points

2) Given signal power to noise spectral density ratio $\frac{S}{N} = 10^4$, and a Gaussian channel with a bandwidth of 1.5 MHz, the channel capacity in kbps is

No, the answer is incorrect.
Score: 0

Accepted Answers:
(Type: Range) 14.3,14.4

1 point

3) Three message signals $s_1(t), s_2(t), s_3(t)$ are transmitted over an AWGN channel with noise power spectral density $\frac{N_o}{2}$.

$$s_1(t) = \begin{cases} 1, 0 \leq t \leq T \\ 0, otherwise \end{cases}$$

$$\begin{cases} 1, 0 \leq t \leq \frac{T}{2} \end{cases}$$

Score: 0

Accepted Answers:
(Type: Numeric) 2

1 point

4) In Question 3, which of the message signals is most vulnerable to errors? ***1 point***

- s_1
- s_2
- s_3
- s_2 and s_3

No, the answer is incorrect.
Score: 0

Accepted Answers:
s_1

5) $\mathbf{X}$ is an n-dimensional Gaussian vector. Its elements X_i are pairwise independent with mean and variance denoted by μ_i and σ_i^2 respectively. The differential entropy of $\mathbf{X}$ is ***0 points***

- $h(X) = \frac{1}{2}\, log_2[2\pi(\sigma_1^2\sigma_2^2 \ldots \sigma_n^2)^{1/n}]$
- $h(X) = \frac{n}{2}\, log_2[\pi(\sigma_1^2\sigma_2^2 \ldots \sigma_n^2)^{1/n}]$
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No, the answer is incorrect.
Score: 0

Accepted Answers:
$h(X) = \frac{n}{2}\, log_2[2\pi(\sigma_1^2\sigma_2^2 \ldots \sigma_n^2)^{1/n}]$

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