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Courses » Principles of Digital Communications

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Unit 6 - Week 5

Course outline

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Week 5

Lecture 24 : Probability of Error for M-ary Scheme

Lecture 25 : Pulse Code Modulation : Quantization

Lecture 26 : Uniform Quantizer

Lecture 27 : Step Size and Quantization Noise

Lecture 28 : Non-uniform Quantizer (Lloyd-Max Quantizer)

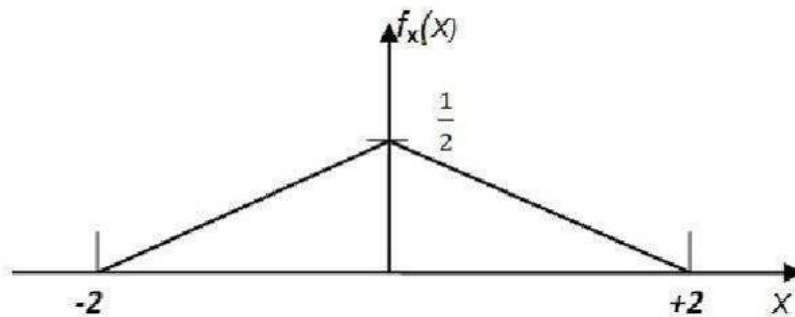
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Assignment 5

The due date for submitting this assignment has passed.

As per our records you have not submitted this **Due on 2018-09-12, 23:59 IST.** assignment.

1) A random signal is modeled as a stationary process $X(t)$. At any time instant t , the value **1 point** of the signal is a random variable with probability density function (pdf) $f_X(x)$ shown in the figure



below.

Assume the bandwidth of this process to be 5 kHz. The random signal is passed through a uniform quantizer with sampling frequency equal to the Nyquist rate and 32 quantization levels for transmission using a binary PCM system. Signal-to-Quantization Noise Ratio (SQNR) is defined as the ratio of the average signal power to the average quantization noise power. For the above signal, the resulting SQNR in dB is approximately

- 21
- 23
- 25
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No, the answer is incorrect.

Score: 0

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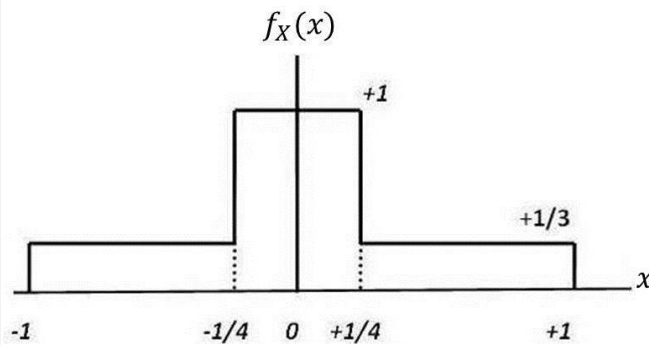
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No, the answer is incorrect.**Score: 0****Accepted Answers:**

33

3) Consider a random signal with values drawn independently at each instant, from the probability distribution shown below.

1 point

For uniform quantization with 2^ν levels and $\nu \geq 3$, the SQNR in terms of q is

- $0.1q^2$
- $0.2q^2$
- $0.7q^2$
- $0.9q^2$

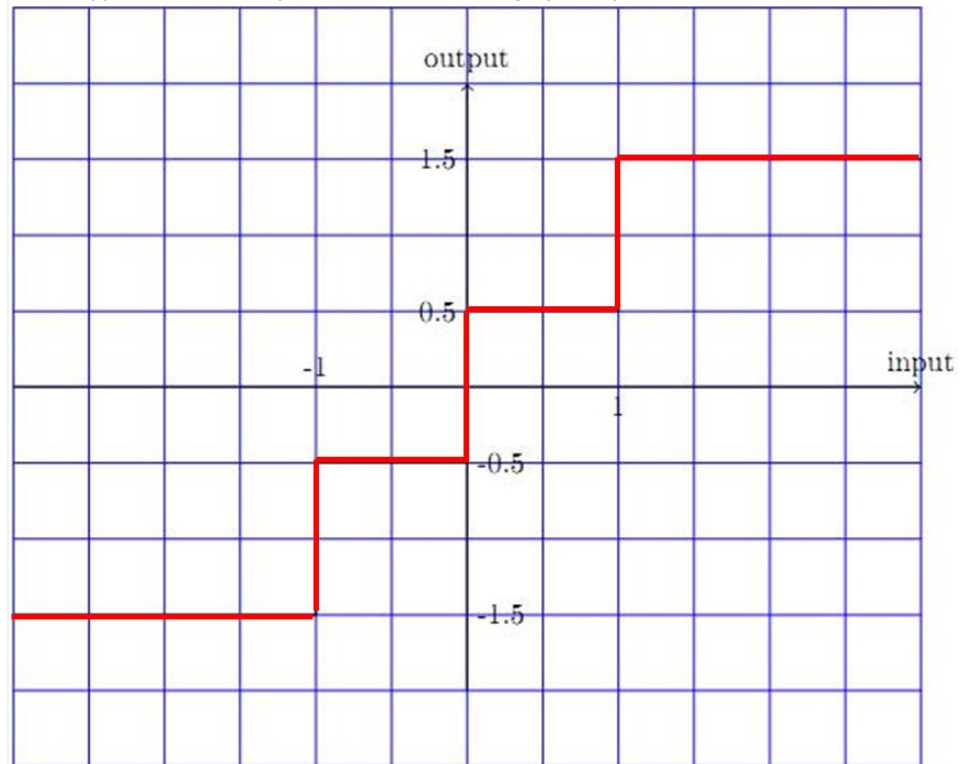
No, the answer is incorrect.**Score: 0****Accepted Answers:** $0.7q^2$

4) Five signals each of bandwidth 1 kHz are multiplexed and transmitted using binary PCM. The maximum tolerable error in sample amplitudes is 0.2% of the peak amplitude. The signals are to be sampled at least 20% above the Nyquist rate. Given that the minimum bandwidth required for a binary PCM transmission is half the bit rate, the minimum bandwidth required in kHz is

No, the answer is incorrect.**Score: 0****Accepted Answers:***(Type: Range) 53.5,54.5***1 point**

5) A sample function of a zero-mean, unit-variance Gaussian random process is uniformly sampled. It

is then applied to a uniform quantizer with the following input-output characteristic.



The entropy (in bits) of the quantizer output is

No, the answer is incorrect.

Score: 0

Accepted Answers:

(Type: Range) 1.9,1.95

1 point

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