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NPTEL

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Courses » Information Theory, Coding and Cryptography

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Unit 2 - Week 1

Course outline

How to access the portal

Week 1

 Introduction to Information Theory Entropy, Mutual Information, Conditional and Joint Entropy Measures for Continuous Random Variable, Relative Entropy Quiz : Assignment 1 New Lesson

Week 2

Week 3

Week 4

Week 5

Week 6

Week 7

Week 8

Assignment 1

The due date for submitting this assignment has passed.

As per our records you have not submitted this assignment. **Due on 2018-08-15, 23:59 IST.**

1) Pick the correct choice 1 point

- $I(X; Y) = H(X) - H(X|Y)$
- $I(X; Y) = H(Y) - H(Y|X)$
- Both a. and b
- None

No, the answer is incorrect.
Score: 0

Accepted Answers:
Both a. and b

2) The chain rule is given by 1 point

- $H(X, Y) = H(X) + H(Y|X)$
- $H(X, Y) = H(Y) - H(X|Y)$
- $H(X, Y) = H(X) + H(X|Y)$
- None

No, the answer is incorrect.
Score: 0

Accepted Answers:
 $H(X, Y) = H(X) + H(Y|X)$

3) Can differential entropy be negative? 1 point

- No, never
- Yes, depends on the choice of the pdf

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Week 12

Additional Lectures

4) When is $H(X|Y) = H(X)$?

1 point

- When X and Y are dependent
- When $X = f(Y)$
- When $X \neq Y$
- When X and Y are independent

No, the answer is incorrect.**Score: 0****Accepted Answers:***When X and Y are independent*5) A source, X, has an infinitely large set of outputs with probability of occurrence given by $P(x^i) = 2^{-i}$, $i = 1, 2, 3, \dots$. What is the average self information, $H(X)$, of this source? **0 points**

- $H(p^2)$ bits
- $1/p H(p)$ bits
- $pH(p)$ bits
- $H(p)$ bits

No, the answer is incorrect.**Score: 0****Accepted Answers:** *$1/p H(p)$ bits*6) The Jensen's inequality given by _____ where $E[.]$ is the expectation operator. **1 point**

- $E[f(X)] \geq f[E(X)]$
- $E[f(X)] < f[E(X)]$
- $E[f(X)] \leq f[E(X)]$
- None

No, the answer is incorrect.**Score: 0****Accepted Answers:** *$E[f(X)] \geq f[E(X)]$* 7) Let X denote the number of tosses required for a coin until the first tail appears. The entropy $H(X)$ if the probability of getting a tail is p is given by **1 point**

- $H(p)$
- $p H(p)$
- $1/p H(p)$
- $p^2 H(p)$

No, the answer is incorrect.**Score: 0****Accepted Answers:** *$1/p H(p)$* 8) Suppose a source produces independent symbols from the alphabet $\{a_1, a_2, a_3\}$, with probabilities $p_1 = 0.4999999$, $p_2 = 0.4999999$, and $p_3 = 0.0000002$. The entropy, $H(X)$, of this source is **1 point**

- Less than 1
- More than 1

- Equal to 1
- None

No, the answer is incorrect.

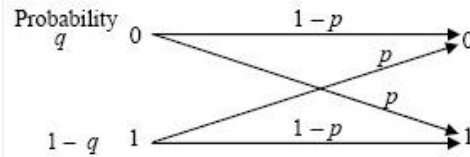
Score: 0

Accepted Answers:

More than 1

9) The channel shown below is a

1 point



- binary asymmetric channel
- binary symmetric channel
- ternary symmetric channel
- ternary asymmetric channel

No, the answer is incorrect.

Score: 0

Accepted Answers:

binary symmetric channel

10) Which of the following gives the differential entropy, $h(X)$, for the uniformly distributed random variable X with the pdf,

1 point

$$p(x) = \begin{cases} a^{-1} & (0 \leq x \leq a) \\ 0 & (\text{otherwise}) \end{cases}$$

- $\log_2(2a)$
- $\log_2(a^2)$
- $\log_2(a)$
- $\log_2(a^{-1})$

No, the answer is incorrect.

Score: 0

Accepted Answers:

$\log_2(a)$

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