- Pre-course Materials
- Topic 1: Course Overview
- **Topic 2: Lossless Source Coding: Hamming Codes**

2.1 Source Coding
Week 1 Quiz due Nov 02, 2015 at 15:30 UT

2.2 Sequence of Yes/No Questions
Week 1 Quiz due Nov 02, 2015 at 15:30 UT

2.3 Entropy of a Bit
Week 1 Quiz due Nov 02, 2015 at 15:30 UT

2.4 Entropy of a Discrete Random Variable
Week 1 Quiz due Nov 02, 2015 at 15:30 UT

2.5 Average Code Length
Week 1 Quiz due Nov 02, 2015 at 15:30 UT

2.6 Huffman Code
Week 1 Quiz due Nov 02, 2015 at 15:30 UT

2.7 Lab 1 - Source Coding
Lab due Nov 02, 2015 at 15:30 UTC

- MATLAB download and

Suppose that you choose one of the four animals with the following probabilities:

p[centipede] = 0.2

p[dog] = 0.4

p[cat] = 0.3

p[mouse] = 0.1

2.5 QUIZ QUESTION 1 (1/1 point)

What is the entropy of the choice of your animal, assuming the probabilities given above? Give your answer to two significant digits (e.g. 1.00).

1.85 ✔ **Answer:** 1.85

1.85

EXPLANATION

Compute the entropy according to the formula

$$H = -\sum_{i=1}^{4} p[animal_i] log_2(p[animal_i])$$

You have used 1 of 3 submissions

2.5 QUIZ QUESTION 2 (1 point possible)

Suppose that I use the following strategy (sequence of yes and no questions) to guess your animal.

1. Does your animal have four legs?

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2. Does your animal like to eat cheese?
3. Does your animal say "meow"?

What is the expected value of the number of questions I need to ask? Give your answer to one decimal place (e.g. 1.0).

1.7 ✖ **Answer:** 2.5

1.7

EXPLANATION

If you choose centipede, I need to ask 1 question.

If you choose dog, I need to ask 3 questions.

If you choose cat, I need to ask 3 questions.

If you choose mouse, I need to ask 2 questions.

Thus, the expected value of the number of questions needed is

$$1 * 0.2 + 3 * 0.4 + 3 * 0.3 + 2 * 0.1 = 2.5$$

You have used 3 of 3 submissions

2.5 QUIZ QUESTION 3 (1/1 point)

The average number of questions required by the strategy in Question 2 is larger than the entropy of the probability distribution of animal choices. However, it is possible to find a better strategy where the average number of questions is smaller than the entropy.

- True
- False ✔

EXPLANATION

False. The entropy is a lower bound on (smaller than) the average number of questions required by any strategy.

You have used 1 of 3 submissions