LE1.1.1: Quantifying Information

pontos 4 / 4 (sem classificação)

For the problems below enter your responses as numeric values. You may find it helpful to use the built-in calculator -- click the icon in the lower righthand corner of the page. It supports the function "log2(...)" which computes the log-base-2 of its argument.

A) You're given a standard deck of 52 playing cards that you start to turn face up, card by card. So far as you know, they're in completely random order.

- How many new bits of information do you get when the first card is flipped over and you learn exactly which card it is?

  Information (in bits): 5.7 ✔ Answer: 5.7

  Explanation
  Before the first card was flipped over there are 52 choices for what we'll see on the first flip. Turning the first card over narrows the choice down to a single card, so we've received log2(52/1) bits of information.

- The fifth card?

  Information (in bits): 5.58 ✔ Answer: 5.585

  Explanation
  After flipping over 4 cards, there are 48 choices for the next card, so flipping over the fifth card gives us log2(48/1) bits of information.

- The last card?

  Information (in bits): 0 ✔ Answer: 0

  Explanation
  If all but one card has been flipped over, we know ahead of time what the final card has to be so we don't receive any information from the last flip. Using the formula, there is only 1 "choice" for the card before the card is flipped and we have the same "choice" afterwards, so, we receive log2(1/1) = 0 bits of information.

B) Z is an unknown N-bit binary number (N > 3). You are told that the first three bits of Z are 011. How many bits of information about Z have you been given?

Information (in bits): 3 ✔ Answer: 3

Explanation
Since we were told about 3 bits of Z it would make sense intuitively that we've been given 3 bits of information! Turning to the formulas: there are 2^N N-bit binary numbers and 2^{N-3} N-bit binary numbers that begin with 011. So we've been given $log_2\left(2^N/2^{N-3}\right) = log_2\left(2^3\right)$ = 3 bits of information (whew!).

Enviar

Answers are displayed within the problem

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Topic: 1. Basics of Information / LE1.1

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I could not understand the last question From where we got that formula?	11
If the probability is 1 If probability comes out to be 1 , in terms of log2 it is "0". So, does it mean it requires 0 bits of inf...	3
Useless That exercise is no use in the real world	2
Need more help with Question B Don't really understand the N-bit stuff (N>3)	5
Lucky guess or is there an actual formula i should know On part B I had no idea how to approach this question. So i saw this part of the question "You ar...	11
External Resources/References ?? I'm not getting this and I've studied, with great success, related matters. Rather than ask for exp...	4
larger Context Can you tell me why this is important in the larger context of building a 32 bit computer. The ins...	5
Clarity question I have a question about the clarity of the question. After revealing the answers, I see that the qu...	3

Q1 This question is confusing: It should be if we know exactly what the next card is, how many infor...	2
Information Formula - Meaning Although the mechanics thru the calculations seems straightforward, just replacing values into t...	2
[STAFF] Grader Tolerance is Low The grader tolerance needs to be narrowed down a bit for this question. For question 2, my ans...	2
Very interesting. Very interesting, but I got no one of the four problems correct. After clicking Show Answers I agr...	1
the number of bits in the example three: roll of two dice at the information content, we get 5.17 bits, so, I want to kn...	2