Exercises for Monday, second hour

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Entropy of a categorical variable Let X be distributed according to the following table:

x	1	2	3	4	5
$\Pr(X = x)$	1/12	1/6	1/6	1/4	1/3

1. Find $H(X)$.
2. Construct a Huffman code for X.
3. Decode the message 001011000011 according to your code.

Huffman tree for a die Let X be distributed uniformly on the set $\{1, 2, 3, 4, 5, 6\}$.

1. Huffman-encode the values of X.
2. What is the average code word length for the tree you have constructed? How does that compare with $H(X)$?
3. If you interpret a codeword length of k as an implicit probability of 2^{-k}, what is then the implicit distribution expressed by your code?

Age order (McKay, Exercise 2.35) You want to know whether A is older than B. A tells you she is older than C.

How much information does that message give you?

Knights and Knaves (McKay, Exercise 2.37) A person who lies two third of the time tells you that φ. How much information does that give you?

Shuffling cards (McKay, Exercise 6.19) Roughly how many bits of uncertainty do you create by thoroughly shuffling a deck of cards?