CS361 Questions: Week 6

You don't have to submit your answers this week, since we have a midterm. However, you still may want to look these over for review.

1. What must be true for the receiver to interpret the answer to a "yes" or "no" question?
2. Why would one want to quantify the information content of a message?
3. Why must the sender and receiver have some shared knowledge and an agreed encoding scheme?
4. Why wouldn't the sender want to transmit more data than the receiver needs to resolve uncertainty?
5. If the receiver knows the answer to a question will be "yes," how many bits of data quantify the information content? Explain.
6. How much information is contained in each of the first three messages from slideset 4, slide 5?
7. Why does the amound of information contained in "The attack is at dawn" depend on the receiver's level of uncertainty?
8. How many bits of information must be transmitted for a sender to send one of exactly 16 messages? Why?
9. How much information content is contained in a message from a space of 256 messages?
10. Explain why very few circumstances are ideal, in terms of sending information content.
11. Explain the difference between the two connotations of the term "bit."
12. Construct the naive encoding for 8 possible messages.
13. Explain why the encoding on slide 14 takes 995 + (5 * 5) bits.
14. How can knowing the prior probabilities of messages lead to a more efficient encoding?
15. Construct an encoding for 4 possible messages that is worse than the naive encoding.
16. What are some implications if it is possible to find an optimal encoding?
17. Name a string in the language consisting of positive, even numbers.
18. Construct a non-prefix-free encoding for the possible rolls of a 6-sided die.

19. Why is it necessary for an encoding to be uniquely decodable?
20. Why is a lossless encoding scheme desirable?
21. Why doesn't Morse code satisfy our criteria for encodings?
22. Calculate the entropy of an 8-sided, fair die (all outcomes are equally likely).
23. If an unbalanced coin is 4 times more likely to yield a tail than a head, what is the entropy of the language?
24. Why is knowing the entropy of a language important?
25. Explain why the total expected number of bits is 27 in the example presented in slide 25.
26. What is the naive encoding for the language in slide 26?
27. What is the entropy of this language?
28. Find an encoding more efficient than the naive encoding for this language.
29. Why is your encoding more efficient than the naive encoding?