

Problem Set #6

ENEE 426, Spring 2008

Due: Monday, May 11

Complete the following problems:

1. Compute the entropy of the following random variables: (5 pts)
 - a. The roll of a die – $\Pr[X=\{1, 2, \dots, 6\}] = 1/6$
 - b. A biased coin – $\Pr[X=\text{heads}]=3/4$; $\Pr[X=\text{tails}]=1/4$
2. Compute the entropy of characters from the English alphabet. Use the character frequencies listed on the Wikipedia entry: http://en.wikipedia.org/wiki/English_alphabet (10 pts)
3. Develop a Huffman Code to optimally encode the alphabet from #2. (10 pts)
4. Suggest a way to achieve better compression of English text over using Huffman codes on a per-character alphabet, which has an actual entropy of around 4.7 bits per character (smaller than the number found in #2). (5 pts)
5. What properties of WiFi make MAC-layer encryption more necessary than in a wired Ethernet network? (5 pts)
6. Describe possible attacks that could be occurring if you visit a website whose certificate is invalid? (5 pts)

Complete the following additional problem (50 points):

1. Complete Laboratory 9, “Queuing Disciplines”, from the Network Simulations Experiment Manual
 - a. Turn in a lab report, as described in the manual, that includes the answers to the questions and graphs generated during the experiments
2. **Extra Credit: Complete Laboratory 10 for 50 extra credit points**