Name: _____

CS422 Homework #2

Due in class on Monday, February 24th

1. If a signal is sampled at a rate of 44,100 samples per second, what is the range of frequencies that can be captured?

2. If two sources are sampled simultaneously at 44,100 samples per second and each sample is 16 bits, what is the rate at which digital data is produced?

3. Suppose a ship uses colored lights to communicate with another ship, and there are five possible colors (red, blue, yellow, green, and white). Further suppose that white is reserved to start and end each message, and that once a message starts one of the other color lights is flashed once every two seconds. If the lights are used to transmit digital information, what is the data rate during message transmission (i.e., during the time between the white lights)?

4. If an optical fiber has a bandwidth of 500 Megahertz and a modem uses 1024 signal levels, what is the maximum data rate according to Nyquist?

5. Using the fiber in the previous question, if the average signal power is 510 units and the average noise power is 34 units, what is the maximum channel capacity according to Shannon?