Chapter 13
MATLAB PROBLEMS

13.1   Write a program to calculate and plot the theoretical P_{be} versus E_b/N_o or *SNR* for a BPSK (antipodal) signal with and without using triple redundancy coding. Use a decoding scheme whereby the message is based on the majority of received bits. Your plots should look similar to Fig. 13.1-5. Then add to your code to simulate an actual coded BPSK system to determine P_{be} for values of E_b/N_o (or *SNR*) from 0 to at least 6 dB. Overlay the simulated P_{be} points onto the theoretical curves. For example you could use "x's " for the simulated P_{be} values. Be sure to use a sufficient number of trials to accurately characterize your system.

13.2   Do Prob. 13.1 except use 5-redundancy coding.

13.3   Do Prob. 13.1 except use (7,4) Hamming coding.

13.4   Do Prob. 13.1 except use (15,7) BCH coding.

13.5   Implement and simulate a BPSK system using the convolutional coding scheme of Fig. 13.3-2. Plot P_{be} versus $\gamma_b = E_b/N_0$ (or *SNR*) with and without convolutional coding. Again, overlay the simulated P_{be} error points onto the theoretical curve and be sure there are a sufficient number of trials to characterize the system's performance.