Problem 1 (Viterbi Algorithm)
Complete the example on page 1.28 of the lecture notes.

Problem 2 (Optimal Demodulation)
Consider BPAM over an ISI channel with AWGN. The assumptions are the same as in Problem 1 of Problem Set 1.

A. Draw one transition step of the trellis used in optimum detection of the transmitted information bit sequence. Label the branches with their corresponding metric.

B. Consider the optimal detection of an information bit sequence of length $N = 7$. The state of the discrete-time system comprising the modulator, the ISI channel and the matched filter is required to be equal to $-1$ at the beginning of the transmission of the information bits and at the end of the reception. Specify the structure of the sequence of transmitted bits to guarantee this.

C. Determine the ML sequence estimate when the sampled MF output sequence is $[+0.7, +1.5, -2.0, -0.3, +0.6, -0.9, +0.4, +1.1]$.

D. Implement the Viterbi decoder for the above ISI channel in Matlab.

E. Determine the BER performance of the optimum demodulator as a function of the SNR by means of Monte-Carlo simulation. (Use the implementation of the discrete-time ISI channel developed in Problem Set 1.) Compare the performance of this system with the performance of BPAM in the AWGN channel.