

1. (10 pts Total) A convolutional encoder is given by the generator polynomial matrix:

$$G = [1 + D^2 \quad 1 + D + D^2 \quad 1 + D + D^2 \quad 1 + D + D^2].$$

- (a) (1 pts) Draw the encoding circuit.
- (b) (1 pts) What is the constraint length of the encoder?
- (c) (2 pts) Draw the state transition diagram.
- (d) (2 pts) Determine (n, k) and d_{free} .
- (e) (4 pts) Using the Viterbi algorithm, decode the following sequence assuming zero initial encoder state.

[0001 1011 0000 0111 1011].