ELG5372 **Error Control Coding** **Fall 2018**

Sample Assignment 5
RS and convolutional codes

Question 1
Find a generator polynomial of a length 31 RS code with $d_{min} = 6$. Answer the following questions.

(a) What is the rate of the code?

(b) If $m(x) = 1+\alpha x+\alpha^5 x^2+\alpha^{11}x^{13}$, what is $c(x)$ assuming that the encoding is nonsystematic?

(c) Draw the nonsystematic encoder structure for your code.

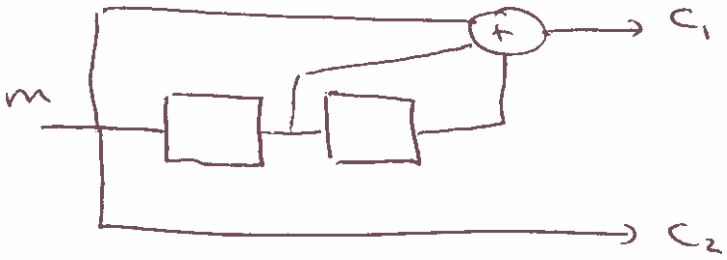
Question 2
For the convolutional encoder shown below, answer the following questions.

(a) What is the rate of the code?

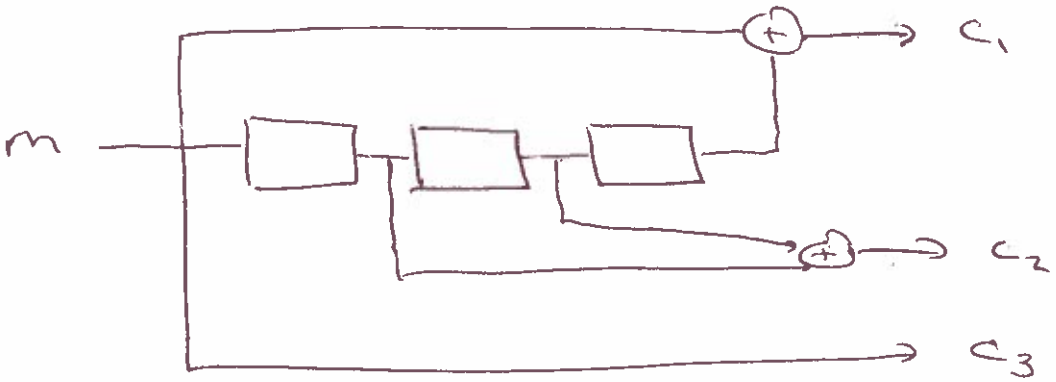
(b) Draw the state diagram of the code.

(c) What is the free distance d_{free} of the code?

(d) Draw the trellis diagram and find the correct path if r = 11,00,10,01,11,00,01,00. Assume that the encoder starts and ends in the all zero state.



Question 3
Give the D transform expression for the convolutional encoder shown below.



Question 4

Find the state diagram for the convolutional encoder shown below. Is the code catastrophic? If so, is it possible to find an equivalent code that is not catastrophic?