# ECS 452: In-Class Exercise #17

Instructions

1. Separate into groups of no more than three persons. **The group cannot be the same as any of your former groups** after the midterm.
2. **Write down all the steps** that you have done to obtain your answers. You may not get full credit even when your answer is correct without showing how you get your answer.
3. **Do not panic.**

Date: **11** / **04** / 2019

Name		ID (last 3 digits)		
Prapun		**5**	**5**	**5**

Consider a convolution encoder represented by the following diagram
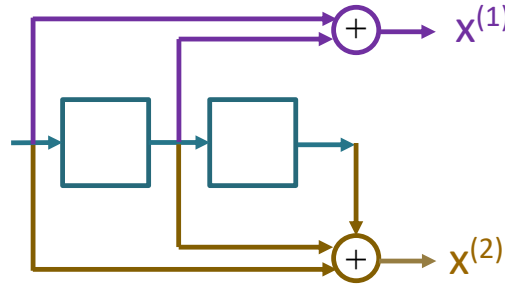
(a) Draw the corresponding state (transition) diagram
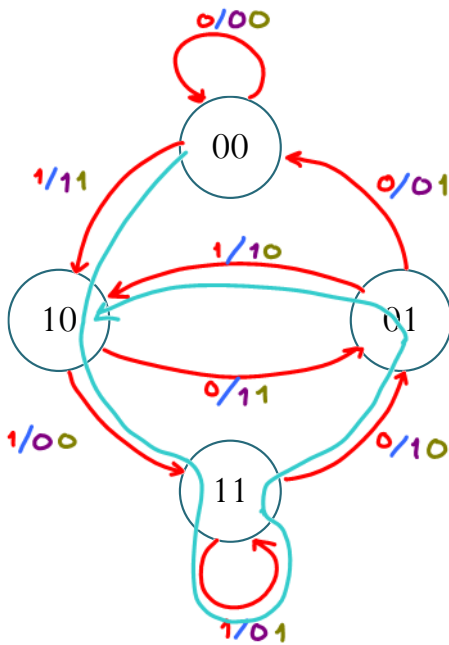
First, observe that this encoder uses a shift register with two FFs which is the same as the one discussed in lecture. Therefore, the arrows will be the same as what we had in the lecture.
Note, however, that the connections that produce the outputs are different from the encoder in lecture. Therefore, we simply need to find the

b	s_1	s_2	$x^{(1)}$	$x^{(2)}$
0	0	0	0	0
1	0	0	1	1
0	0	1	0	1
1	0	1	1	0
0	1	0	1	1
1	1	0	0	0
0	1	1	1	0
1	1	1	0	1

(b) Suppose the information bits (the message bits) are **b** = 11101.
Find the corresponding codeword **x**

i. by using the direct method (filling out the table below) without the help of the state diagram from part (a).

Note that the final output is one row vector resulting from interleaving the upper and lower outputs.

b	s_1	s_2	$x^{(1)}$	$x^{(2)}$
1	0	0	1	1
1	1	0	0	0
1	1	1	0	1
0	1	1	1	0
1	0	1	1	0

x = 1 1 0 0 0 1 1 0 1 0

and

ii. by "tracing" the corresponding path on the state diagram derived in part (a)
Draw/highlight your trace on the state diagram in part (a) using different pen color.

See the trace in the diagram on the left

x = 1 1 0 0 0 1 1 0 1 0