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ECE300 HW 9

1. a b c
   d e f

a) Code rate
input = 2 bits
output = 4 bits
= 2/4

Constraint Length
# of states = $2^{(L-1)k}$
$2^6 = 2^{(L-1)2}$
$6 = 2L-2$
$L = 4$

b) list previous states and corresponding input bits such that : 0 1 1 / 1 0 1

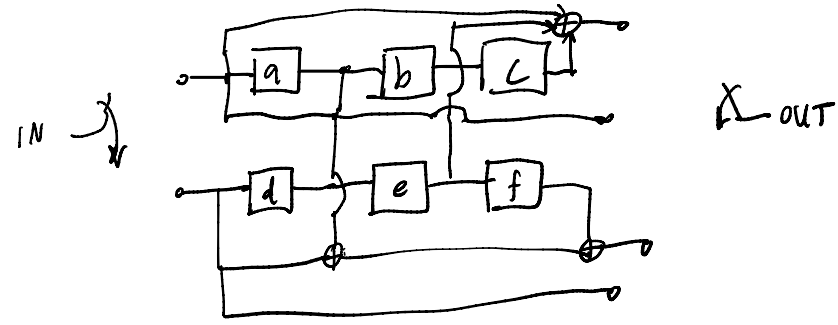
previous states	input: 0	input: 1
110	010	
010		
110		
011		
111		
011		
111		
010		

c) 1. 2^k previous states, $k = 2$
$2^2 = 4$, each states has 6 possible symbols
$2^6 = 64$
# of ACS operations per unit time necessary $= 4 \cdot 64 = 256$ bits

2. size of traceback buffer $= 2 \cdot 2^6 = 128$ bits
(2: previous & current states)

3. size of cost buffer $= 2^6 = 64$ values

2.



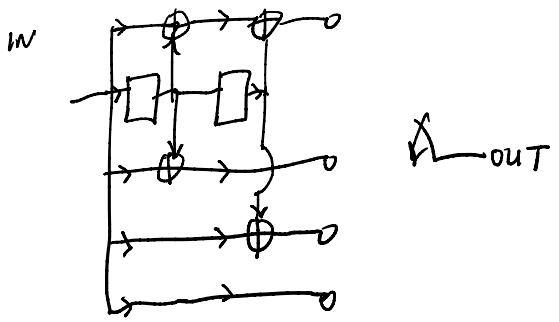
8-PSK $y_i = 0.02a_i - 0.3a_{i-1} + a_{i-2} + 0.2a_{i-3} - 0.04a_{i-4} + v_i$

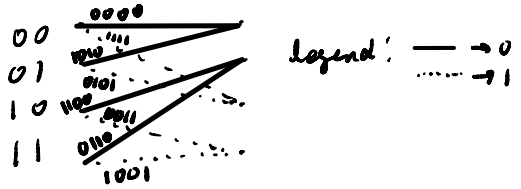
a) # of states $= 8^4 = 4096$ states
8 possible previous states

b) 4 bits per soft symbol
total bits of traceback buffer per unit time $= 3 \cdot 8^4 = 12288$ bits
(8 previous states, 3 bits)

present cost buffer $= 8^4 = 4096$ entries

3.





4. a) trellis for 1/n convolutional coder

output bits, $n = 3$

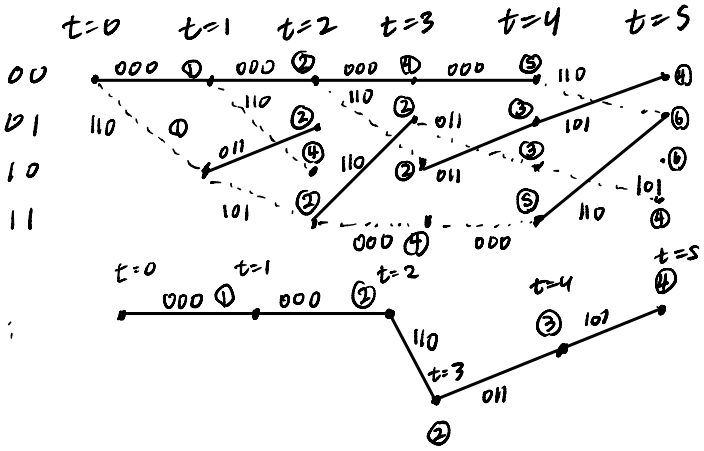
# of states $= 2^{(L-1)k}$

$4 = 2^k (\frac{1}{2})$

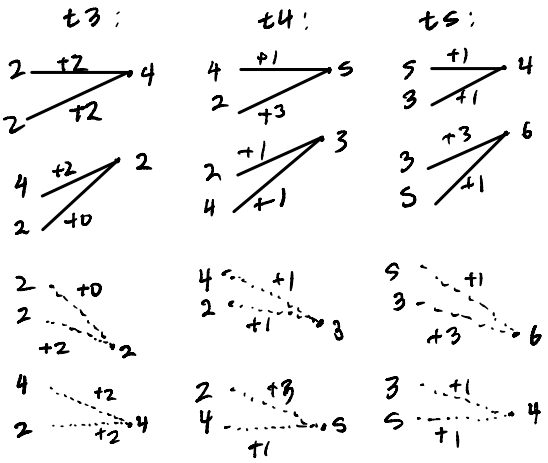
$8 = 2^k$

$L = 3$

b) 010 001 110 010 100



terminal decision:



Data: 00100