

ECS 452: In-Class Exercise # 18

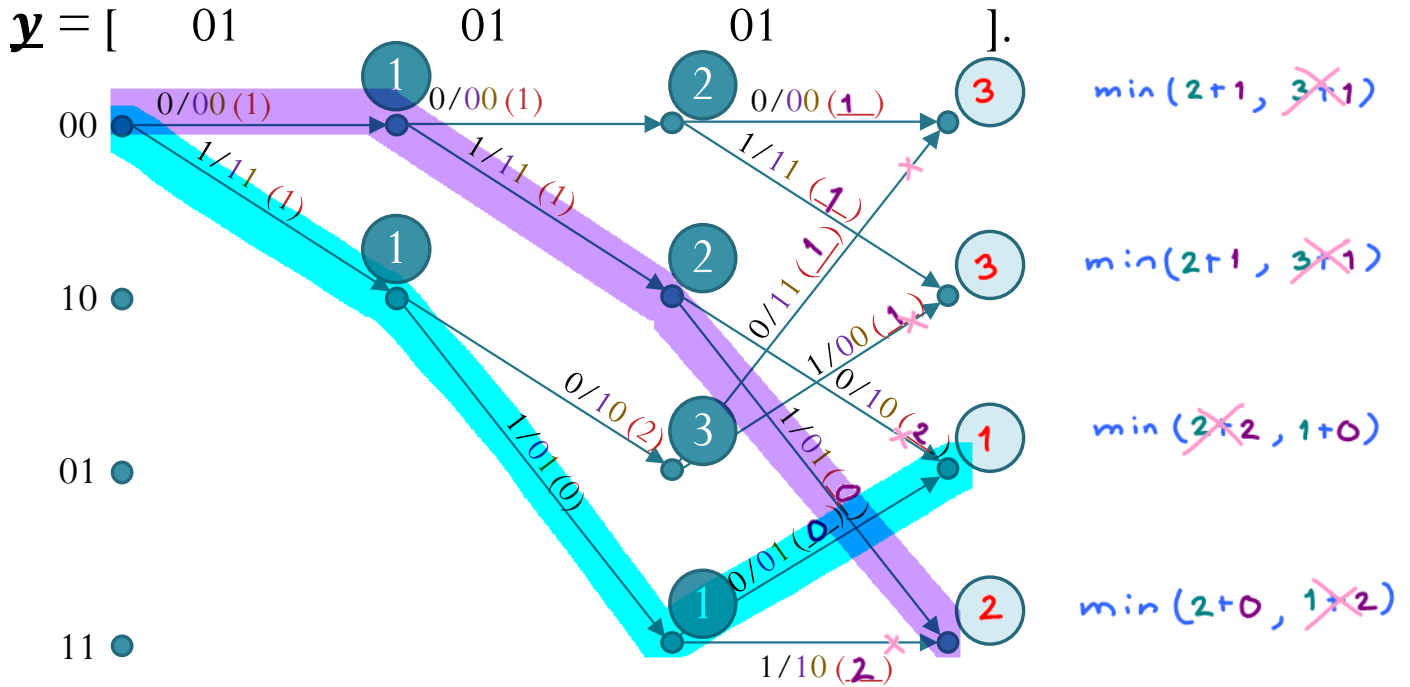
Instructions

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: 19/04 / 2019			
Name			ID <small>(last 3 digits)</small>
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Consider a convolutional encoder whose trellis diagram is given below.

Vector \underline{y} and the numbers enclosed by the round brackets () are used in the second problem.



1. Suppose the data vector is $\underline{b} = [011]$. Find the corresponding codeword \underline{x} .

Read from the highlighted path: [001101]

2. Suppose that we observe $\underline{y} = 010101$ at the input of the minimum distance decoder.

The decoder uses Viterbi's algorithm. (The first two steps were already calculated for you.) Your job is to work on the last step.

- a. Write down
 - (1) all the (distance) values on the branches and
 - (2) the (chosen) cumulative distance values inside all the circles

in the figure above.
- b. Put "x" on the branches that are removed by the Viterbi algorithm.
- c. Find the decoded codeword $\hat{\underline{x}}$ and the decoded message $\hat{\underline{b}}$.

Read from the highlighted path:
 $\hat{\underline{x}} = \underline{[110101]} \quad \hat{\underline{b}} = \underline{[110]}$