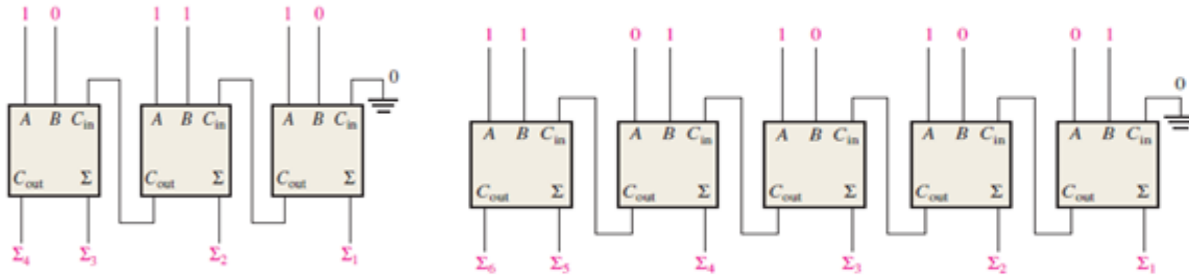


Problem Solving Assignment # 4

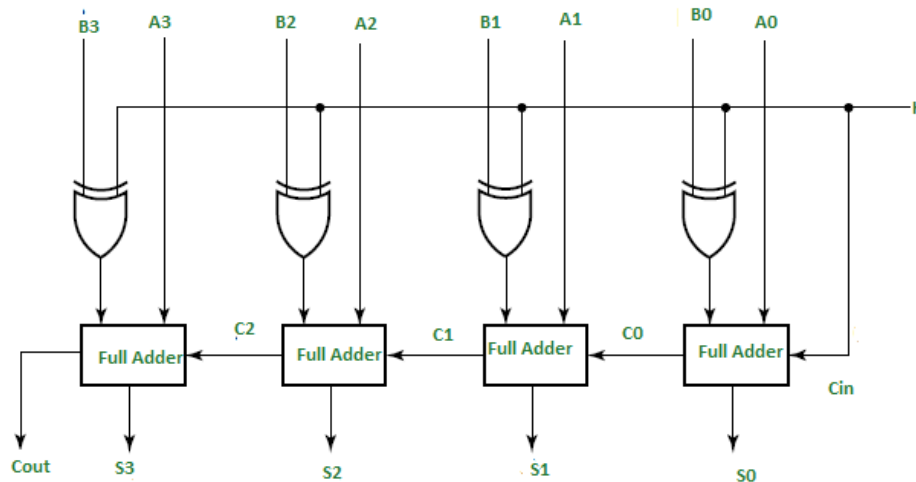
Due Date: 19th April, 21

[CLO 2, 3 & 4]

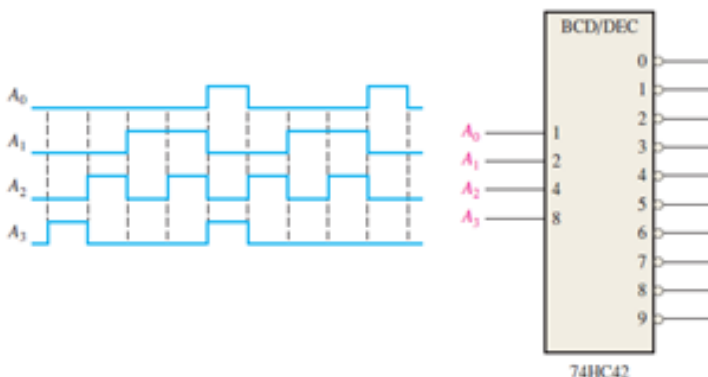
- Design a logic circuit whose output is HIGH only when a majority of inputs A, B, C are Low.
- Design a logic circuit whose output is HIGH only when all three inputs A, B, C are at the same level.
- For the parallel adder in the figure, determine the complete sum by analysis of the logical operation of the circuit. Verify your result by longhand addition of the two input numbers.



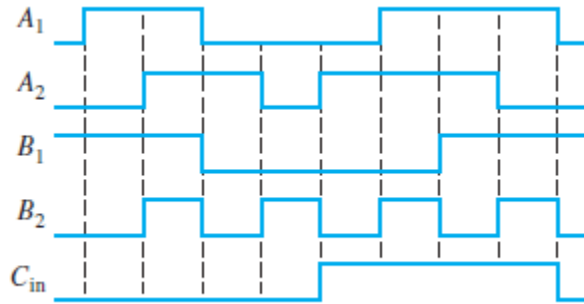
- The circuit shown in figure below is a 4-bit circuit that can add or subtract numbers in a form used in computers (positive numbers in true form; negative numbers in complement form). (a) Explain what happens when the K ($\overline{\text{Add/Subt.}}$) input is HIGH. (b) What happens when K ($\overline{\text{Add/Subt.}}$) is LOW? Also, calculate the output when $K(\overline{\text{Add/Subt.}}) = 1$, $A = 1010$, and $B = 1101$.



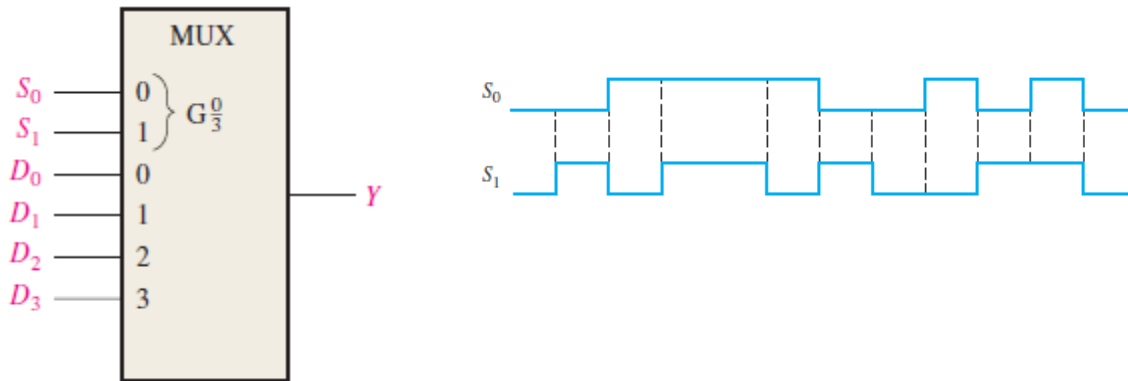
- Show the logic required to convert a 10-bit binary number to Gray code and use that logic to convert the following binary numbers to Gray code:
 (a) 1010111100 (b) 1111000011 (c) 1011110011 (d) 1000000001
- BCD numbers are applied sequentially to the BCD-to-decimal decoder in the attached figure. Draw a timing diagram, showing each output in the proper relationship with the others and with the inputs.



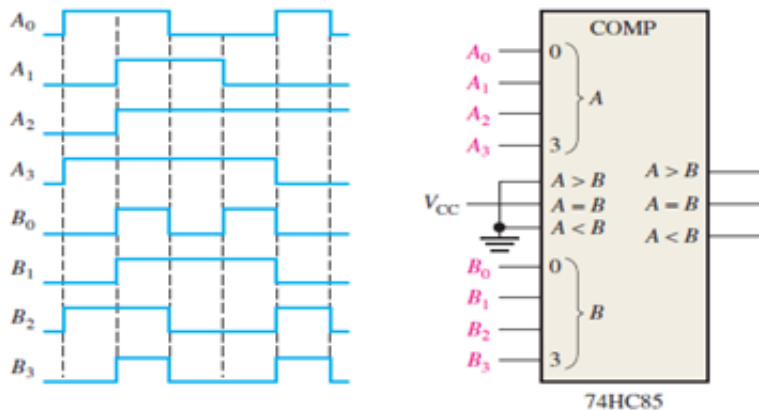
- g. The input waveforms in the figure are applied to a 2-bit adder. Determine the waveforms for the sum and the output carry in relation to the inputs by constructing a timing diagram.



- h. If the data-select inputs to the multiplexer in attached figure are sequenced as shown by the waveforms S_0 and S_1 , determine the output waveform Y for constant $D_3D_2D_1D_0 = 1010$. (Ignore $G0/3$)



- i. For the 4-bit comparator in the figure, plot each output waveform for the inputs shown. The outputs are active-HIGH.



- j. (i) Determine the input condition needed to activate output Z in figures.
(ii) Assume that it is the LOW state of Z that is to activate the alarm. Change the circuit diagram to reflect this, and then use the revised diagram to determine the input conditions need to activate the alarm.

