University of Maryland Baltimore County
Department of Computer Science and Electrical Engineering

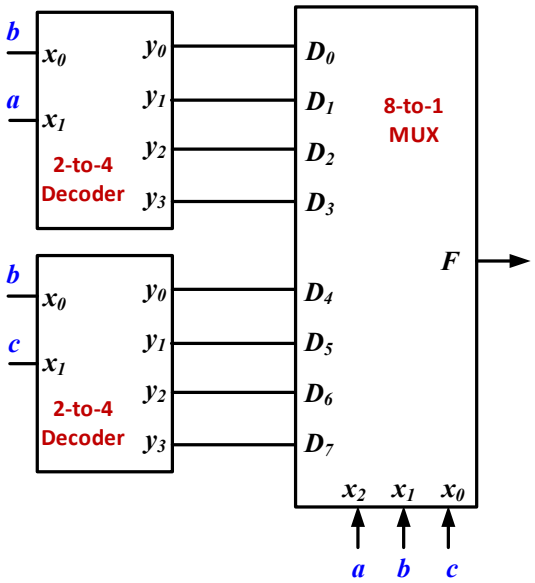
CMPE 212, Digital Systems Design

Assignment #4

Due: Mon 4/11/16 in the class

Question 1: *(15 Points)*

Find the canonical SOP expression for the function *F* realized by the following circuit:



Question 2: *(15 Points)*

Realize the following set of functions using only a single 74154 decoder module and logic gates:

$$f_1(A,B,C,D) = \sum m(2,4,10,11,12,13)$$

$$f_2(A,B,C,D) = C(\bar{B} + A) + \bar{A}\bar{C}D$$

$$f_3(A,B,C,D) = \prod M(0,1,2,3,6,7,8,9,12,14,15)$$

Question 3: *(20 Points)*

Design a 32-to-1 multiplexer using:

(a) Two 74150 modules, one inverter, and one NAND gate.
(b) Only 74151A modules. (Do not use any additional gates.)

Question 4: *(20 Points)*

Design a subtraction module with 1-bit data *A* and *B*, and carry-in C_{in}. The modules outputs the result *S*, and carry-out C_{out}.

(a) Use a 3- to- 8 decoder and 2-input OR gates.
(b) Use two 4-1 multiplexer and one inverter.

Question 5: *(30 Points)*

Design a BCD to excess-3 code converter using:

(a) PLA (Like Figure 5.7 in the textbook)
(b) ROM (Like Figure 5.25 in the textbook)