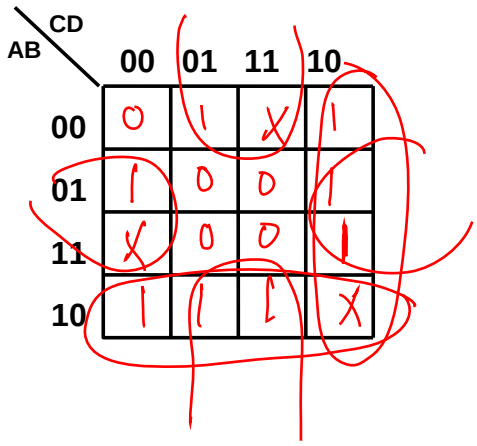
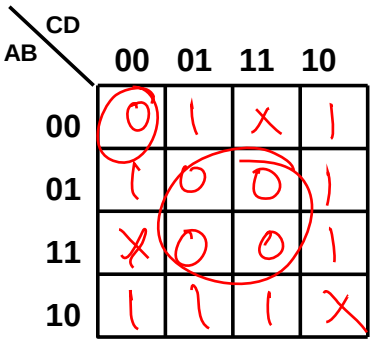
QUESTION 4 [6 marks] Given

$$F(A,B,C,D) = \Sigma m(1,2,4,6,8,9,11,14) + d(3,10,12)$$

Use Karnaugh maps to find a minimal **POS** and **SOP** of F.





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

(Sum-of-Products)

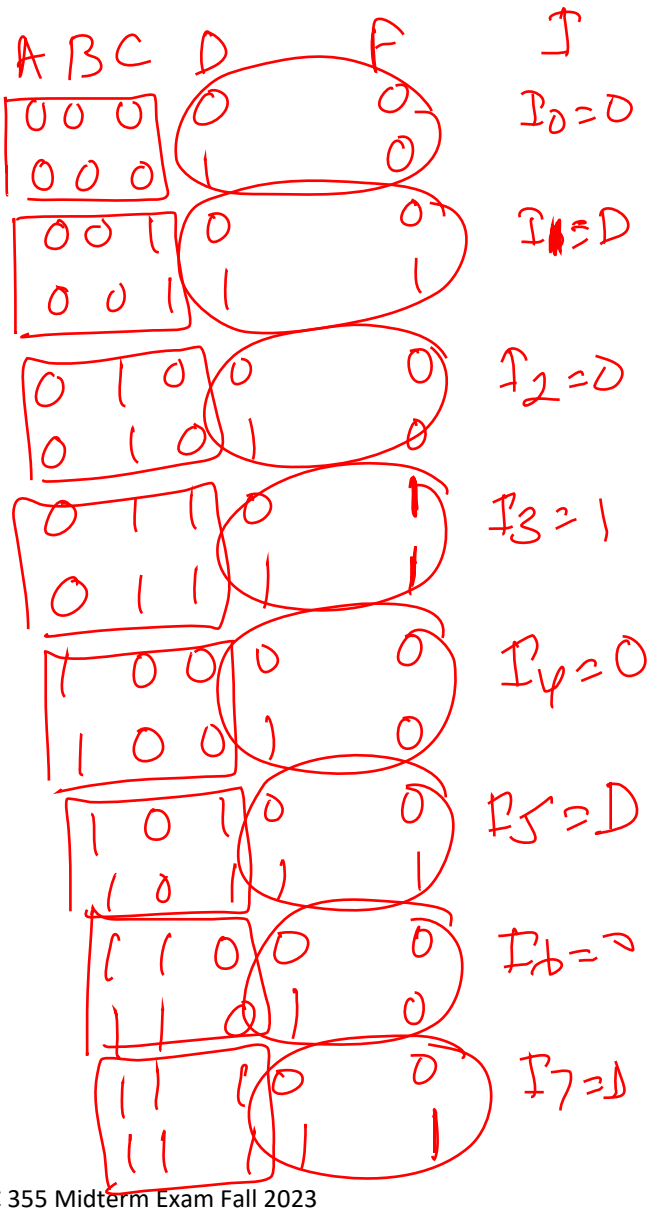
F(A,B,C,D) = $(A+B+C+D)\cdot(\bar{A}+\bar{D})$

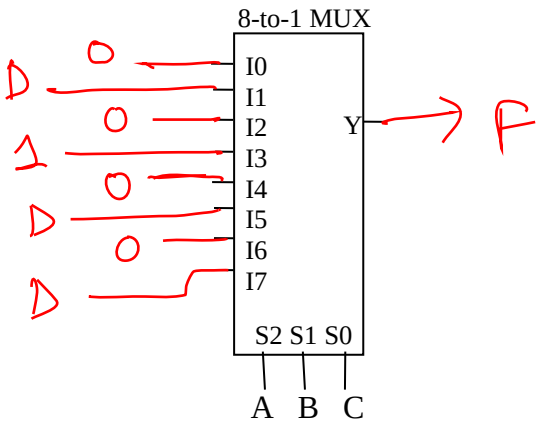
(Product-of-Sums)

QUESTION 5 [8 marks] You are given the following Karnaugh map:

AB \ CD	00	01	11	10
00			1	
01			1	1
11			1	
10			1	

Realize the function above (i.e., draw a circuit) using one 8-to-1 multiplexer and any number of 2-input gates and inverters. Observe that A, B and C are connected to the select inputs. Show your work.





QUESTION 6 [6 marks] Design a multi-output digital circuit that maps the 3-bit input to a 3-bit output as follows:

INPUT A B C	OUTPUT X Y Z
0 0 0	0 1 0
0 0 1	X 1 1
0 1 0	1 0 0
0 1 1	1 1 0
1 0 0	0 X 0
1 0 1	0 1 X
1 1 0	X 0 1
1 1 1	0 0 1