HOMEWORK 6: CS 209 (k-Map)

Due Date: Wednesday. 10/16/2024

It is important to label clearly and state are you finding EPI or API and also mention which terms are in each of the EPI or API clearly apart from drawing the loops.

1. Given the following truth table, with A, B and C being the inputs and F is the output.

A	B	C	F
0	0	0	0
0	0	1	0
0	1	0	1
0	1	1	1
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	1

   a) Determine the minterm expansion using both the summation notation and in terms of the inputs.
   b) Now draw the K-Map and find out all the essential prime implicants.
   c) Do you need any additional prime implicant, if so find out, and then find out the minimum sum of products expression for the function F.

2. Given F(a, b, c) = $\prod$M(0, 1, 2, 5, 7)
   a) Find the algebraic expression for F as a product of sums (maxterm expansion)
   b) Now draw the K-Map and using K-Map rules find out the essential and additional prime implicants (if any) and determine the minimum POS. State clearly EPI's and API's. If there is no API, state that too.

3. Given F(A,B, C, D) = $\sum$m(3, 5, 7, 8, 9, 11, 13, 14, 15)
   Draw the K-Map
   Work systematically to find the essential and additional prime implicants (if any) and determine the minimum SOP for F

4. Given the following K-Map structure, with 4 inputs, A, B, C and D. Find out the box numbers based on the labelling given, and then find out all the essential prime implicants, and additional prime implicants (if any), then determine the minimum POS for the function F.

CD \ AB	00	01	11	10
00	0	0	0	
01		0		
11		0		0
10	0		0	0

5. Given the following truth table for a three input variable A, B and C and output is F

A	B	C	F
0	0	0	1
0	0	1	0
0	1	0	0
0	1	1	0
1	0	0	0
1	0	1	0
1	1	0	0
1	1	1	1

A) Find out the maxterm expansion
B) Draw the K-Map. Find out essential prime implicants and additional prime implicants (if any) to determine the minimum POS for the function F.