

Logic System Assignment 1

A simple CAD tool based on K-map

Due date:2020/04/15

1. Description

In this homework you will write a program to implement a (2~4-Variable) K-Map simplification process.

Your program should print the decimal notation of each group which you simplify and Minimum SOP (Sum of Product)

2. Requirement

[1] Read the input file

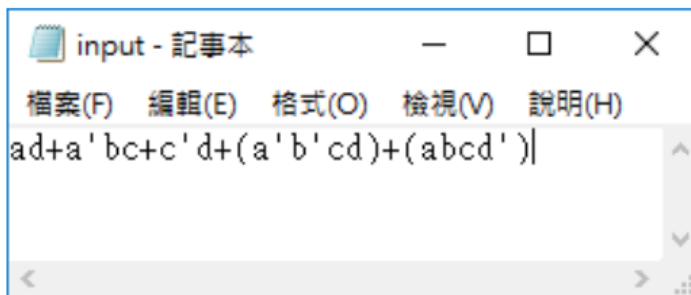
Your program should read input.txt file, and put these terms into K-map.

- Input filename: input.txt

$$F(A,B,C,D) = \sum m(1,5,6,7,9,11,13,15) + \sum d(3,14)$$

The format of input.txt:

```
ad+a'bc+c'd+(a'b'cd)+(abcd')
```



[2] Initialize the terms in the K-map

You can create one two-dimensional arrays to allocate all the 1, 0, and X (don't care) terms of K-map.

Eg. The left-hand diagram, the decimal notation of K Map may be the order of your arrays. Right-hand diagram shows the K Map which is initialized.

AB \ CD	00	01	11	10
00	0	4	12	8
01	1	5	13	9
11	3	7	15	11
10	2	6	14	10

AB \ CD	00	01	11	10
00	1	0	0	1
01	0	1	0	0
11	1	1	1	1
10	1	1	1	1



Index:

AB \ CD	00	01	11	10
00	0	4	12	8
01	1	5	13	9
11	3	7	15	11
10	2	6	14	10

Output format:



Index:

AB \ C	00	01	11	10
0	0	2	6	4
1	1	3	7	5

Output format:



Index:

A \ B	0	1
0	0	2
1	1	3

[3] Write the output file

When the program starts execution, print the initial contents of K-Map at first. After finishing the simplification, Your program should print the decimal notation of each group which you simplify and Minimum SOP (Sum of Product) .Eventually, you should use Boolean algebra to show the Minimum SOP as your solution.

- **Output filename: output.txt**

```

output - 記事本
檔案(F) 編輯(E) 格式(O) 檢視(V) 說明(H)
===== K Map =====
\AB\
CD \ | 00 01 11 10
-----+-----+-----+-----+-----|
00 | 0 | 0 | 0 | 0 | 0 |
-----+-----+-----+-----+-----|
01 | 1 | 1 | 1 | 1 | 1 |
-----+-----+-----+-----+-----|
11 | X | 1 | 1 | 1 | 1 |
-----+-----+-----+-----+-----|
10 | 0 | 1 | 1 | X | 0 |
-----+-----+-----+-----+-----|

group 1: 1, 3, 5, 7, 9, 11, 13, 15
simplification of group 1 -> d
group 2: 6, 7, 14, 15
simplification of group 2 -> bc
F(A,B,C,D) = d + bc

```

Your program should create the file like this.

3. File Specification

You can finish your program in C, C++, Java.

Your program should be compiled as an executable file. (Need to tell TA what OS you use.)

Your program should read input file, and put these terms into K-map. After program execution, output file should be created to dump the information for the simplification results.

4.Hint

You can reference the flow chart below to design your program.

