

Homework 2
Monsoon 2018
CSE 101 - Introduction to Programming

K-Maps

The Karnaugh Map or K-Map is a method of simplifying Boolean algebra expressions. The cells in the K-Map are ordered using the Gray Code. K-Map can be created using either SOP (sum of products) or POS (product of sums). Consider the variables to be w,x,y,z. So, for 2 variables the expression will use w,x; for 3 variables the expression will use w,x,y and for 4 variables the expression will use w,x,y,z. The order of the variables is very important in the K-Map.

Write a program in Python and a test file, which takes a function of maximum 4 variables as input and gives the corresponding minimized function(s) as the output (minimized using the K-Map methodology), considering the case of Don't Care conditions.

Two python files are attached. Complete the code in them and rename the files appropriately. Put it in the folder named HW2_2018xxx, zip it and upload on Backpack. Please add comments to your code so that it become easier to evaluate.

The user will input the number of variables in the expression. The boolean function will be input in the format of a string of numbers enclosed within round brackets (separated by commas) to denote the terms of the expression and followed by the alphabet d preceding the string of numbers (separated by commas) to denote the don't care positions. In case there are no don't care positions d will be succeeded by a hyphen "-". The output will be the simplified Boolean algebra expression in the Sum of Products form. There is no need to check for invalid inputs.

Example 1:

No. of variables: 4

Function: (0,1,2,4,5,6,8,9,12,13,14) d -

Simplified expression: $y' + w'z' + xz'$

Example 2:

No. of variables: 4

Function: (1,3,7,11,15) d (0,2,5)

Simplified expression: $yz + w'x' \text{ OR } yz + w'z$

References:

1. https://en.wikipedia.org/wiki/Karnaugh_map
2. Digital Design: With an Introduction of Verilog, M. Morris Mano