Homework #2
CSE140
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1. Simplify the expression using K-Maps.

(a) F(a, b, c) = ∑(1, 2, 3, 6, 7)

(b) ab + a'b'c' + a'bc'

2.

(a) Simplify the following expressions to minimal sum-of-products form using boolean algebra. Verify using K-Map. (a' + c + d)(b + c + d)(a + b + c') HINT: Use consensus theorem.

(b) Simplify the following expressions to minimal product-of-sums form using boolean algebra. Verify using K-Map. a'c+a'b'd+cd'.
NOTE: You do not need to mention the name of any theorem or axiom used.

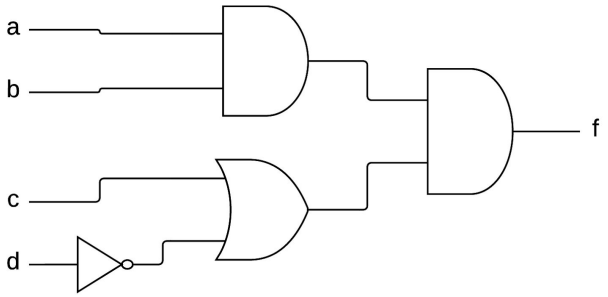
3. Logic minimisation using k-maps

a. A bulb in the staircase has 3 switches. The bulb is turned ON for the following state of the switches.
   - Switch A is ON, Switches B,C are OFF
   - Switch C is ON, Switches A,B are OFF
   - Switches B,C are ON, Switch A is OFF
   - Switches A,C are ON, Switch B is OFF

   Answer the following questions for the above problem
   i. Give the truth table
   ii. Give expression for output in canonical sum of products form
   iii. Minimize the output expression obtained in part ii using k-map
   iv. Draw the logic circuit for the minimized equation from part iii using any logic gates

b. Determine the minimized SOP **and** POS expression of the following function using k-maps $f(A,B,C,D) = \sum m(4, 6, 8, 10, 11, 15) + \sum d(3,5,7,9)$

4. Determine whether the two following circuits are equivalent using Boolean algebra.
Circuit 1:



Circuit 2: