Department of Computer Science & Engineering

Assignment 3: KARNAUGH MAPS

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Course: *Digital Logic & System Design* – Instructor: *Prof. Preeti Ranjan Panda*
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Our Approach

We have employed the following approach to solve the problem:

1. Evaluate the list of terms that together represent the condensed term.
2. Now, every term in the above list represents a point on the k-map.
3. Convert every term in the above list into indices in the k-map coordinate system.
4. If the k-map contains 1/'x' at all the above indices, report TRUE else report FALSE.
5. Next, let the upper-most leftmost coordinate be (lx, ly) and the bottom-most rightmost coordinate be (rx, ry).
6. Since, the k-map is circular/continuous through its edges, check if all the points between (lx, ly) and (rx, ry) are legal. If not, swap ry, ly and rx, lx accordingly. Finally report (lx, ly), (rx, ry).

Testing

We have done exhaustive testing of our program for functions of 2, 3 and 4 variables, covering all possibilities to ensure the correctness of our code. We have attached the screenshots of the terminal and the GUI output for each of the test cases below:

2 variables

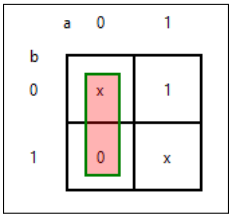

Figure 1: Result `"FALSE"` for the term [0, None]

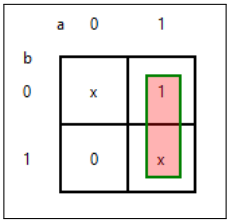

Figure 2: Result `"TRUE"` for the term [1, None]

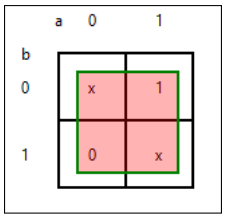

Figure 3: Result `"FALSE"` for the term [None, None]

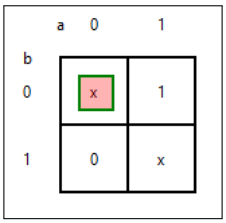

Figure 4: Result `"TRUE"` for the term [0, 0]

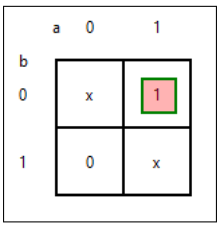

Figure 5: Result `"TRUE"` for the term [1, 0]

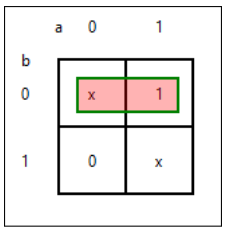

Figure 6: Result `"TRUE"` for the term [None, 0]

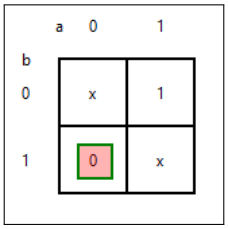

Figure 7: Result `"FALSE"` for the term [0, 1]

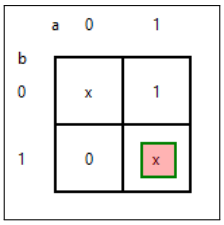

Figure 8: Result `"TRUE"` for the term [1, 1]

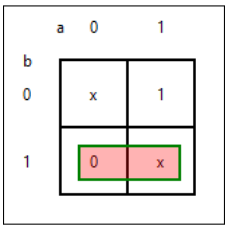

Figure 9: Result `"FALSE"` for the term [None, 1]

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3 variables

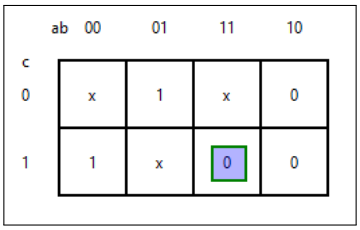

Figure 10: Result `"FALSE"` for the term [1, 1, 1]

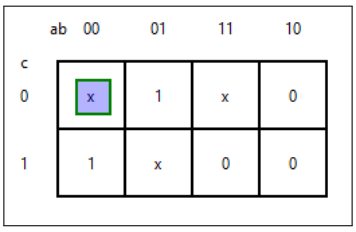

Figure 11: Result `"TRUE"` for the term [0, 0, 0]

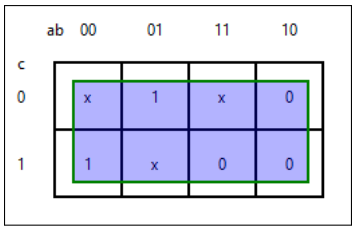

Figure 12: Result `"FALSE"` for the term [None, None, None]

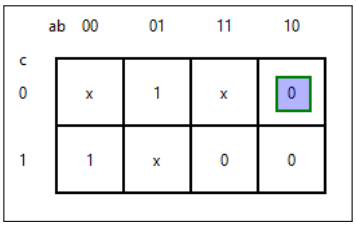

Figure 13: Result `"FALSE"` for the term [1, 0, 0]

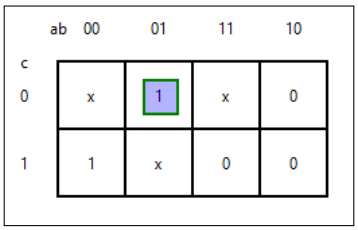

Figure 14: Result `"TRUE"` for the term [0, 1, 0]

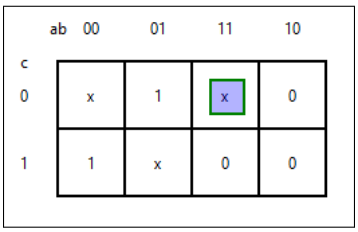

Figure 15: Result `"TRUE"` for the term [1, 1, 0]

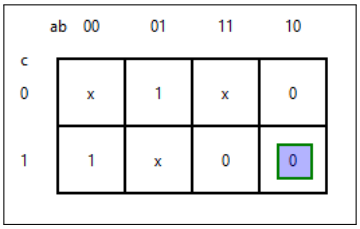

Figure 16: Result `"FALSE"` for the term [1, 0, 1]

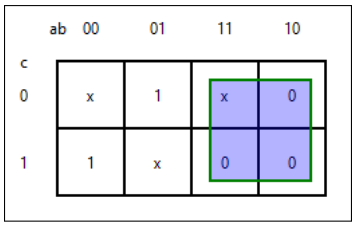

Figure 17: Result `"FALSE"` for the term [1, None, None]

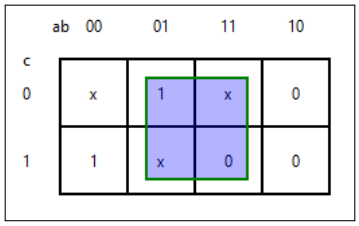

Figure 18: Result `"FALSE"` for the term [None, 1, None]

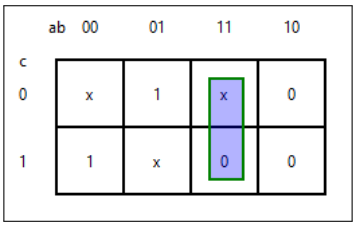

Figure 19: Result `"FALSE"` for the term [1, 1, None]

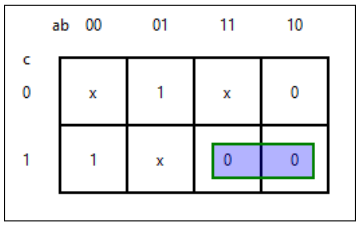

Figure 20: Result `"FALSE"` for the term [1, None, 1]

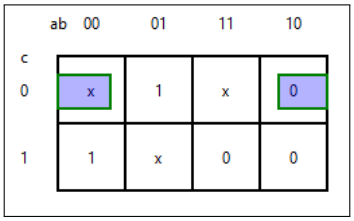

Figure 21: Result `"FALSE"` for the term [None, 0, 0]

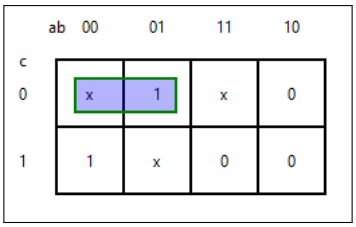

Figure 22: Result `"TRUE"` for the term [0, None, 0]

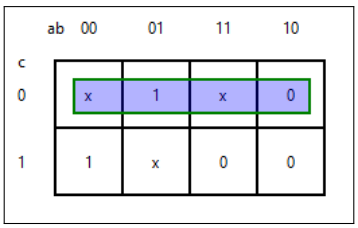

Figure 23: Result `"FALSE"` for the term [None, None, 0]

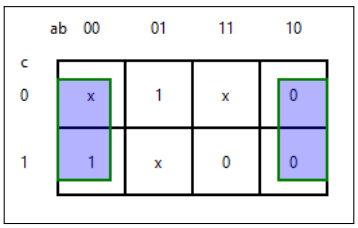

Figure 24: Result `"FALSE"` for the term [None, 0, None]

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4 variables

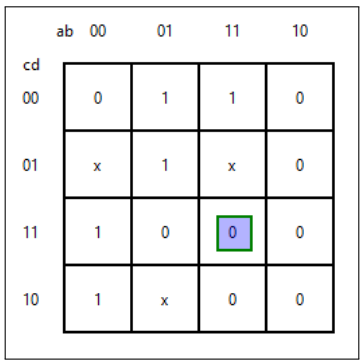

Figure 25: Result `"FALSE"` for the term [1, 1, 1, 1]

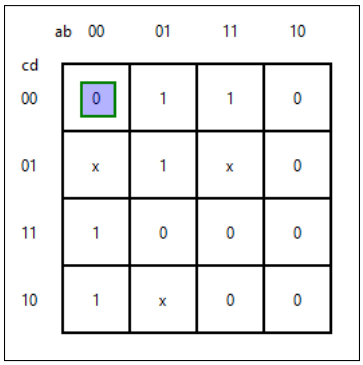

Figure 26: Result `"FALSE"` for the term [0, 0, 0, 0]

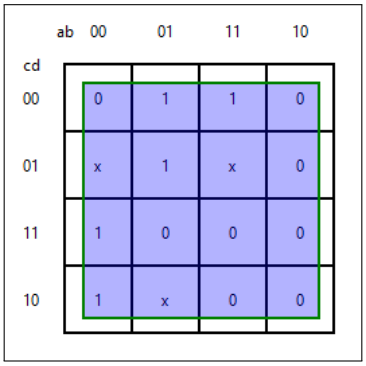

Figure 27: Result `"FALSE"` for the term [None, None, None, None]

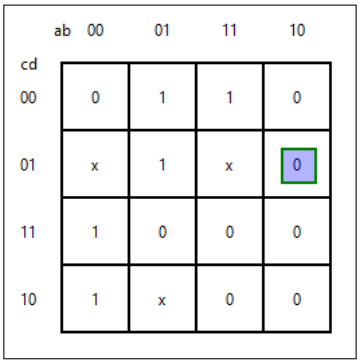

Figure 28: Result `"FALSE"` for the term [1, 0, 0, 1]

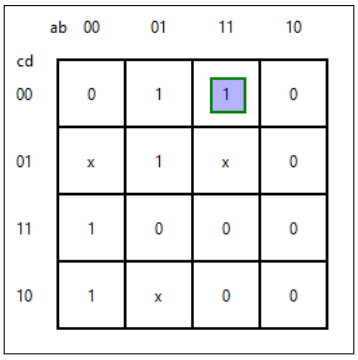

Figure 29: Result `"TRUE"` for the term [1, 1, 0, 0]

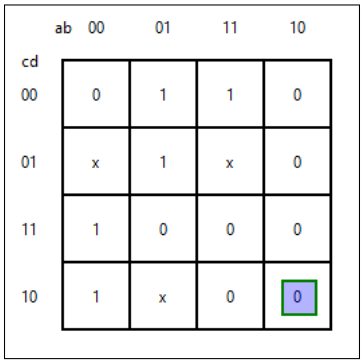

Figure 30: Result `"FALSE"` for the term [1, 0, 1, 0]

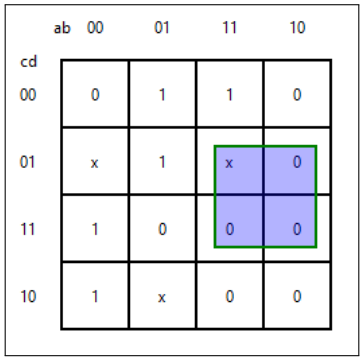

Figure 31: Result `"FALSE"` for the term [1, None, None, 1]

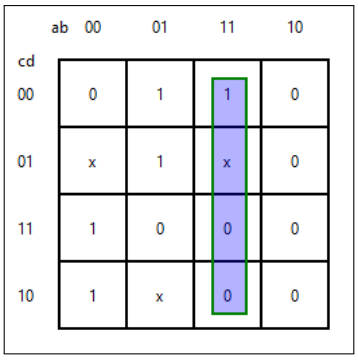

Figure 32: Result `"FALSE"` for the term [1, 1, None, None]

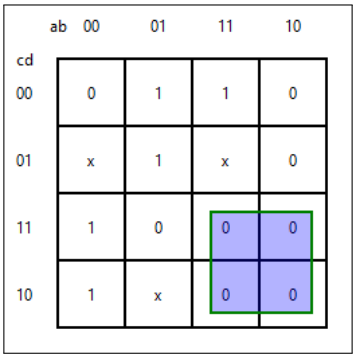

Figure 33: Result `"FALSE"` for the term [1, None, 1, None]

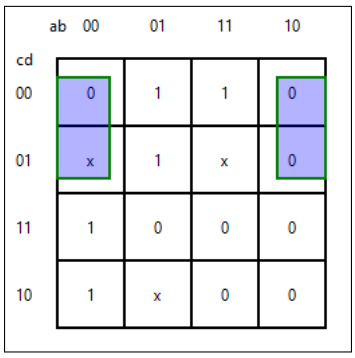

Figure 34: Result `"FALSE"` for the term [None, 0, 0, None]

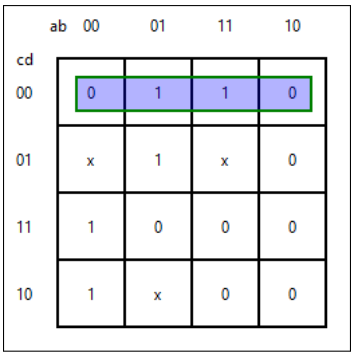

Figure 35: Result `"FALSE"` for the term [None, None, 0, 0]

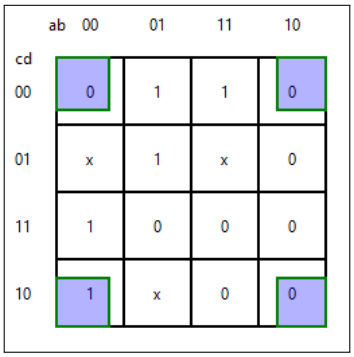

Figure 36: Result `"FALSE"` for the term [None, 0, None, 0]