

CMSC 313 Spring 2024

Homework 3

due Monday, February 26, 11:59pm

For every exercise, show your work. Not showing complete work will result in penalties. Clearly show your Karnaugh Map for each problem and box your final minimized boolean expression. Note the difference in input variable names between different problems.

Exercise 1. Create a 3-variable Karnaugh Map and find the minimized SOP expression for the given formulas.

- a. (5pts) $F_1(a, b, c) = \overline{a\bar{c} + c\bar{a}b + \bar{a}b\bar{c}}$
- b. (5pts) $F_2(a, b, c) = \Sigma(0, 1, 2, 4, 6, 7)$
- c. (5pts) $F_3(a, b, c) = \Pi(1, 2, 4, 7)$

Exercise 2. Create a 4 variable Karnaugh Map and find the minimized SOP expression for the given formulas. The notation “ $d()$ ” describes the minterms that are “don’t cares”.

- a. (4pts) $G_1(w, x, y, z) = \Sigma(0, 1, 5, 6, 7, 8, 10, 13, 15)$
- b. (4pts) $G_2(w, x, y, z) = \Sigma(0, 1, 2, 3, 4, 6, 8, 10)$
- c. (4pts) $G_4(w, x, y, z) = \Pi(0, 2, 3, 4, 8, 10, 11, 12) + d(1, 7, 14)$
- d. (5pts) $G_3(w, x, y, z) = \Sigma(0, 1, 2, 3, 4, 7, 8, 10, 11) + d(5, 6, 9, 12, 14)$

Exercise 3. Create a Karnaugh Map and find the minimized expression POS (circling the zeros) for the given formulas. The notation “ $d()$ ” describes the minterms that are “don’t cares”.

- a. (4pts) $H_1(x, y, z) = \Sigma(5, 7)$
- b. (4pts) $H_2(w, x, y, z) = \Sigma(0, 2, 12, 14) + d(1, 8, 9, 13)$
- c. (5pts) $H_3(w, x, y, z) = \Sigma(4, 5, 9, 11, 12, 15)$
- d. (5pts) $H_4(w, x, y, z) = \Pi(0, 1, 6, 10, 11, 14, 15) + d(4, 5, 8, 12)$