Please submit questions 4.2, and 4.5 (Part A and B) from your reference book and the following problems for this homework.

1 - Simplify the following Boolean functions using Karnaugh map:

(a) \( F(A, B, C, D) = \Sigma m (4, 6, 7, 15) \)
(b) \( F(w, x, y, z) = \Sigma m (2, 3, 12, 13, 14, 15) \)
(c) \( F(A, B, C, D) = \Sigma m (3, 7, 11, 13, 14, 15) \)

2 - Simplify the following Boolean functions using Karnaugh map:

(a) \( F(A, B, C, D, E) = \Sigma m (0, 1, 4, 5, 16, 17, 21, 25, 29) \)
(b) \( F(A, B, C, D, E) = \Sigma m (0, 2, 3, 4, 5, 6, 7, 11, 15, 16, 18, 19, 23, 27, 31) \)
(c) \( F = A'BC'CE' + A'B'C'D' + B'D'E' + B'CD' + CDE' + BDE' \)

3 - Simplify the following functions and implement them with only “NOR” gates. Use minimum number of gates.

(a) \( F = wx' + y'z' + w'yz' \)
(b) \( F(w, x, y, z) = \Sigma m (5, 6, 9, 10) \)

4 – Implement the functions of problem 3 with only “NAND” gates. Use minimum number of gates.

5 - Derive the logic equation and circuit diagram for a circuit with three inputs \( A, B, \) and \( C. \) The output is to be high only when exactly one of the three inputs is high. Use only NAND gates in the design.