INF1400- Uke 03

Folkens, her kommer det en del oppgaver som skal gi dere god trening innen det å bruke Karnaugh-diagram til forkortning av uttrykk. Løs også alle oppgave som står i boka i slutten av kapittel 3.

1. Simplify the following boolean expressions using a Karnaugh-diagram:
a): BA + D'B' + DB'A
b): CZ + Z'W + CW' + C'ZW
c): B'A' + D'A' + DB'A

2. Simplify the following Boolean functions F
a): F(W,X,Y,Z) = Sum m(0, 2, 3, 4, 8, 9, 10, 14)
b): F(A,B,C,D) = Sum m(3, 6, 7, 8, 10, 11, 13, 14, 15)
c): F(W,X,Y,Z) = Sum m(0, 1, 2, 5, 6, 7, 8, 9, 10, 13, 14, 15)

3. Simplify the following Boolean functions F together with the don't-care conditions
a): F(A,B,C,D) = Sum m(3, 6, 7, 10, 14, 15), don't-care conditions: d(A,B,C,D) = Sum m(9, 11, 12, 13)
b): F(A,B,C,D) = Sum m(1, 2, 7, 9, 15), don't-care conditions: d(A,B,C,D) = Sum m(5, 11, 13)
c): F(W,X,Y,Z) = Sum m(9, 11, 13, 15), don't-care conditions: d(W,X,Y,Z) = Sum m(0, 2, 3, 5, 7, 8, 10, 14)

4. Simplify the following Boolean expressions, using four-variable maps:
F = wxy + yz + xy'z + x'y

5. Simplify the following Boolean function by first finding the essential prime implicants:
F(A, B, C, D) = Σ (0, 2, 3, 5, 7, 8, 10, 11, 14, 15).

6. Simplify the following Boolean function, using five-variable maps:
F(A, B, C, D, E) = Σ (0, 1, 4, 5, 16, 17, 21, 25, 29)

7. Simplify the following Boolean function *F*, together with the don't-care conditions *d,* and then express the simplified function in sum of minterms:
F(x, y, z) = Σ (0, 1, 2, 4, 5)
d(x, y, z) = Σ (3, 6, 7).

8. Given
F(A, B, C, D) = Σ(0, 4, 5, 7, 8, 12, 13, 15)
G(A, B, C, D) = Π(0, 1, 7, 8, 9, 10, 11, 12, 15)
Use 4-variable maps to find
a) Simplified F•G
b) Simplified F+G

9. Draw the multiple-level NOR circuit for the following expression:
F = w(x + y + z) + xyz.

10. Design a combinational circuit with three inputs x, y and z, and three outputs A, B and C. When the binary input is 0, 1, 2 and 3, the binary output is one greater than the input. When the binary input is 4, 5, 6 and 7, the binary output is one less than the input.