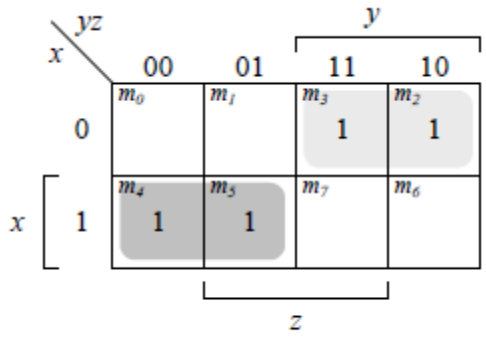
You are expected to solve homework problems individually. If needed, you may seek help from your friends. However, do not copy. Show all steps with your solutions for full credit.

Name: Key **/ 50**

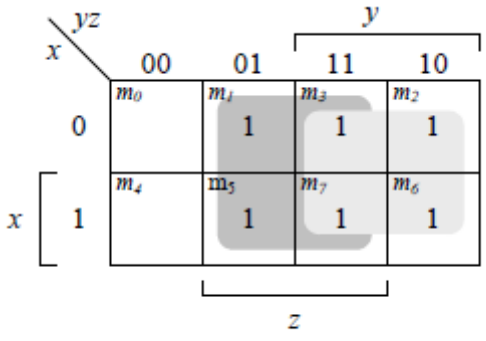
1) (10 points) Simplify the following Boolean functions, using three-variable maps:

a) F(x, y, z) = ∑(2, 3, 4, 5)



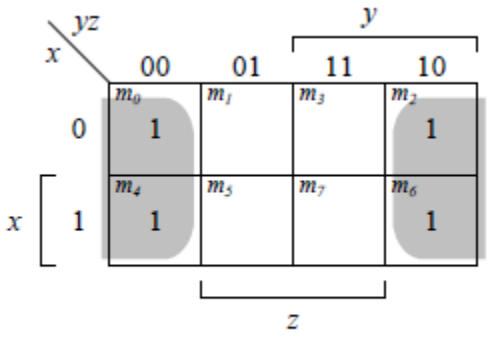
$F = xy' + x'y$

b) F(x, y, z) = ∑(1, 2, 3, 5, 6, 7)



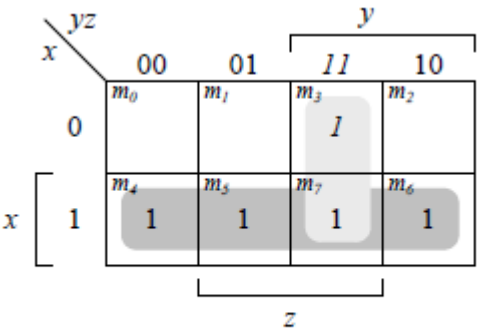
$F = y + z$

c) F(x, y, z) = ∑(0, 2, 4, 6)



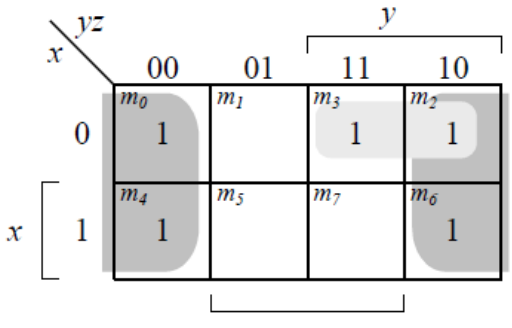
$F = z'$

d) F(x, y, z) = ∑(3, 4, 5, 6, 7)



$F = x + y\,z$

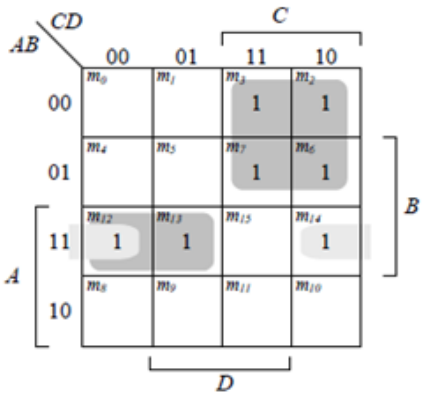
e) $F = x'y + yz' + y'z'$



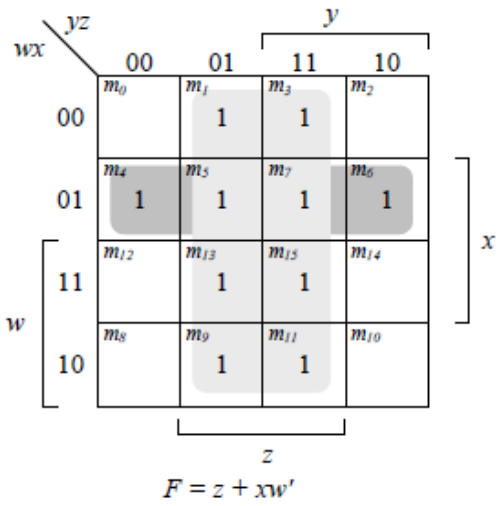
$F = = x'y + z'$

2) (16 points) Simplify the following Boolean functions, using four-variable maps:

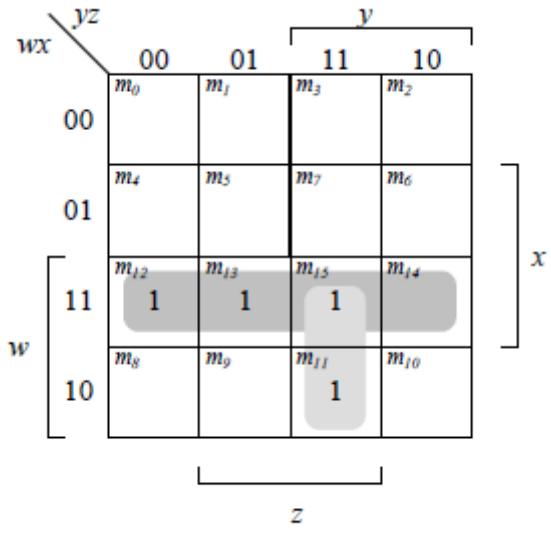
a) F (A, B, C, D) = ∑(2, 3, 6, 7, 12, 13, 14)



b) F (w, x, y, z) = ∑(1, 3, 4, 5, 6, 7, 9, 11, 13, 15)

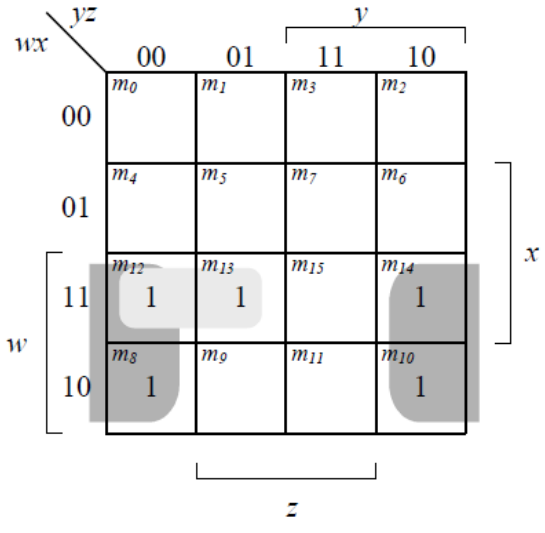


c) F (w, x, y, z) = ∑(11, 12, 13, 14, 15)



$F = wx + wyz$

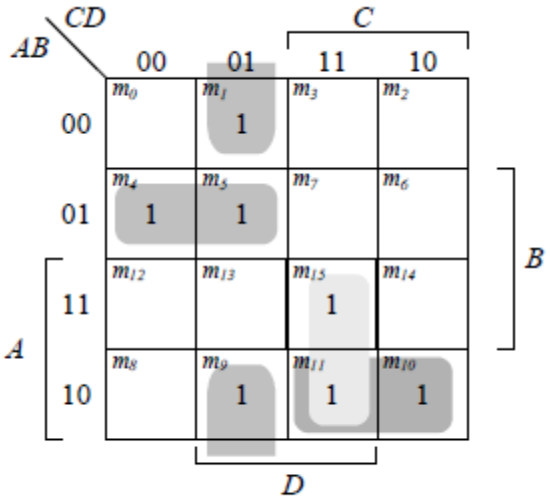
d) F (w, x, y, z) = ∑(8, 10, 12, 13, 14)



$F = wz' + xy'w$

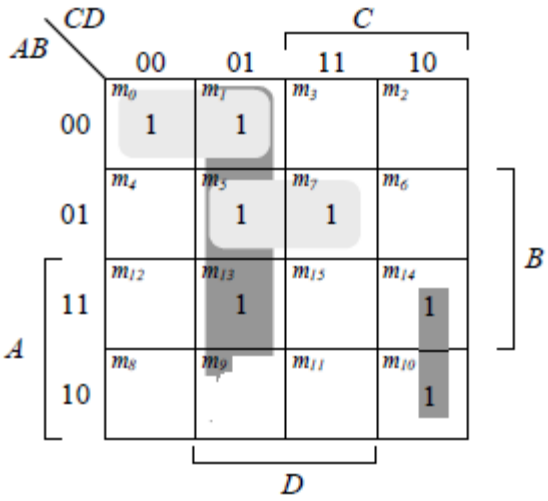
3) (12 points) Simplify the following Boolean expressions, using four-variable maps:

a. A′B′C′D + AB′D + A′BC′ + ABCD + AB′C



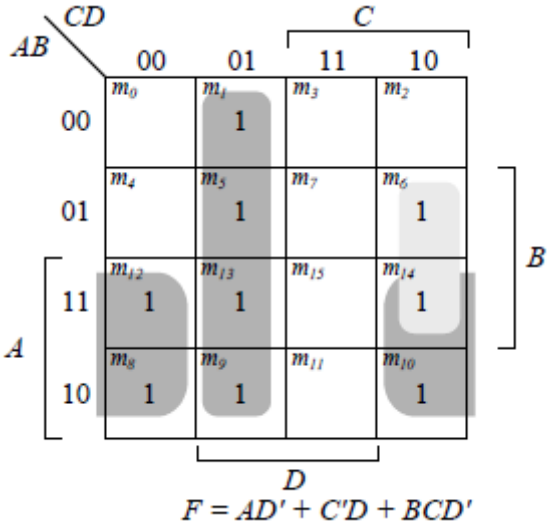
$F = A'BC' + B'C'D + ACD + AB'C$

b. A′B′C′D′ + BC′D + A′C′D + A′BCD + ACD′

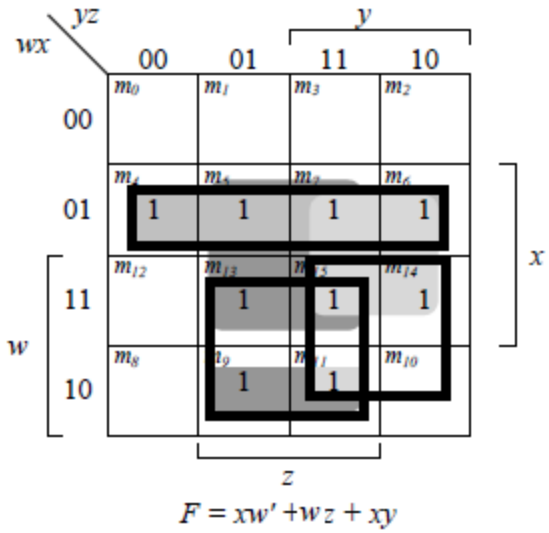


$F = BC'D + A'BD + A'B'C' + ACD'$

c. AD′ + B′C′D + BCD′+ BC′D

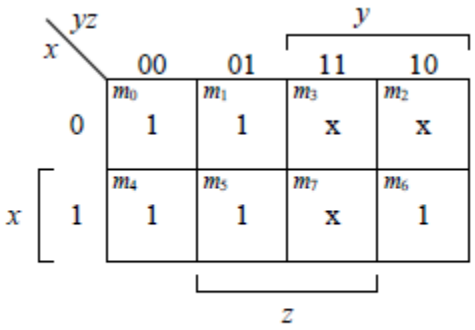


d. wxy + xz + wx′z + w′x



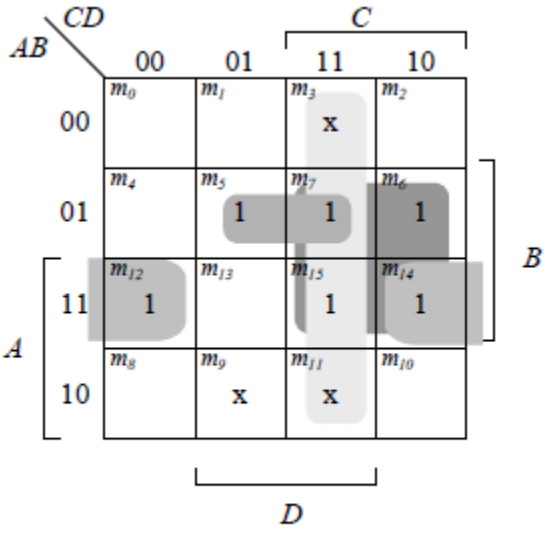
4) (12 points) Simplify the following Boolean function F, together with the don't-care conditions d.

a. F(x, y, z) = ∑(0, 1, 4, 5, 6)
d(x, y, z) = (2, 3, 7)



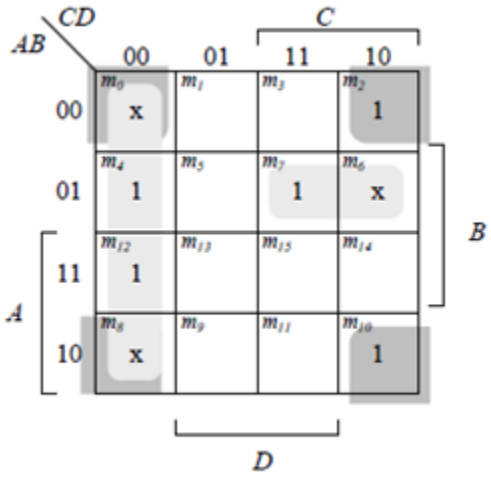
$F = 1$

b. F(A, B, C, D) = ∑(5, 6, 7, 12, 14, 15)
d(A, B, C, D) = ∑(3, 9, 11)



$F = BC + ABD' + A'BD$

c. F(A, B, C, D) = ∑(4, 12, 7, 2, 10)
d (A, B, C, D) = ∑(0, 6, 8)



$F = B'D' + C'D' + A'BC$