Problem 1: FILL IN THE TRUTH TABLE FOR BCD TO 7 SEGMENT DECODER

CHAR	A	B	C	D	a	b	c	d	e	f	g
H	0	0	0	0							
E	0	0	0	1							
L	0	0	1	0							
L	0	0	1	1							
O	0	1	0	0							
space	0	1	0	1							
P	0	1	1	0							
U	0	1	1	1							
P	1	0	0	0							
-	1	0	0	1							
C	1	0	1	0							
P	1	0	1	1							
E	1	1	0	0							
	1	1	0	1	X	X	X	X	X	X	X
	1	1	1	0	X	X	X	X	X	X	X
	1	1	1	1	X	X	X	X	X	X	X

Deriving the Boolean equations for each segments of the Seven-segment Display, use K-mapping.

K-Map of segment a

CD \ AB	00	01	11	10
00				
01				
11				
10				

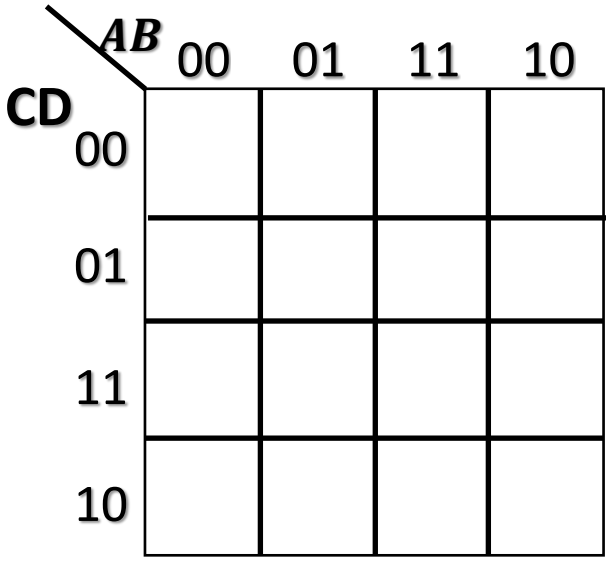
Segment a =

K-Map of segment b

CD \ AB	00	01	11	10
00				
01				
11				
10				

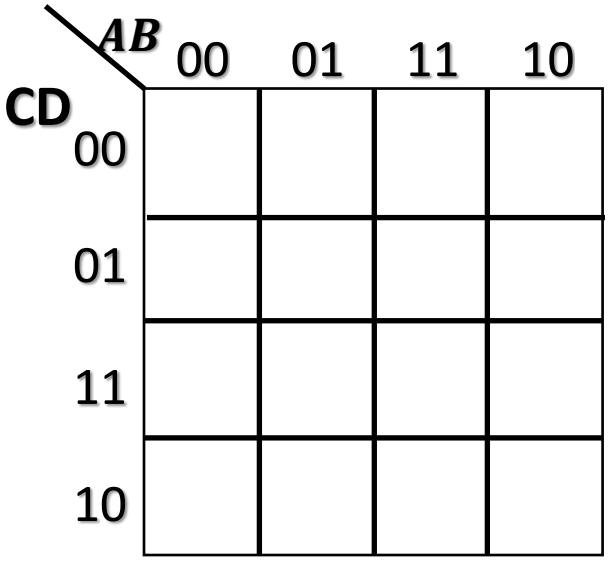
Segment b =

K-Map of segment c



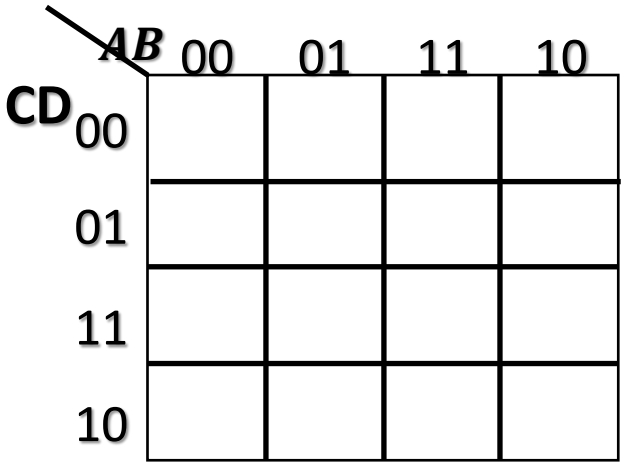
Segment c =

K-Map of segment d



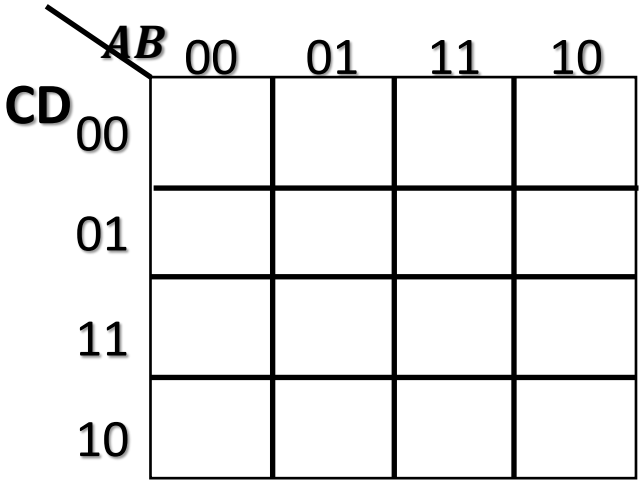
Segment d =

K-Map of segment e



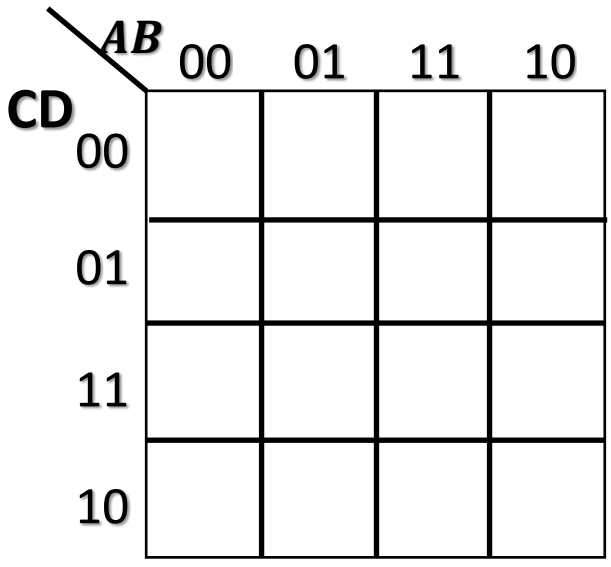
Segment e =

K-Map of segment f



Segment f =

K-Map of segment g



Segment g =

A. Direct Method

Implement the following Boolean expressions using MUX:

(a) $F(x, y, z) = \Sigma(0, 1, 5, 7)$

(b) $F(x, y, z) = \Pi(1, 2, 3, 6, 7)$

(c) $F(w, y, x, z) = \Sigma(2, 3, 12, 13, 14, 15)$

(d) $F(A, B, C, D) = \Pi(3, 7, 11, 13, 14, 15)$

B. Folding Method

Implement the following Boolean functions using MUXs:

(a) $F(w, x, y, z) = \Sigma(1, 4, 5, 6, 12, 14, 15)$
using **w** as input variable.

(b) $F(A, B, C, D) = \Sigma(0, 1, 2, 4, 5, 7, 11, 15)$
using **B** as input variable.

(c) $F(w, x, y, z) = \Sigma(2, 3, 10, 11, 12, 13, 14, 15)$
using **y** as input variable.

(d) $F(A, B, C, D) = \Sigma(0, 2, 4, 5, 6, 7, 8, 10, 13, 15)$
using **D** as input variable.

(e) $F(w, x, y, z) = \Pi(0, 2, 4, 5, 6, 7, 8, 10)$

(i) using **w** as input variable.
(ii) using **x** as input variable.
(iii) using **y** as input variable.
(iv) using **z** as input variable.