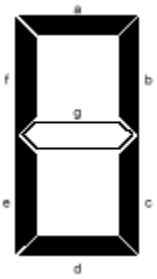
CS 3843 HW 2 Digital Computer Logic – Spring 2020

[100 %]

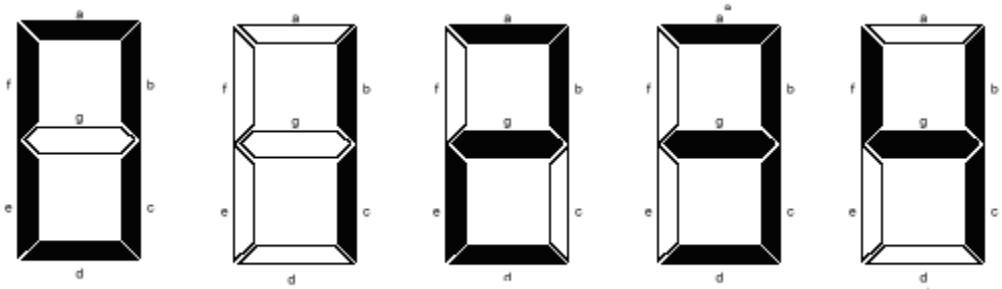
The goal of this homework is to design the logic circuit for a 7-segment display.

7-segment display has 7 segments: a, b, c, d, e, f, e and g. When we have to display a digit then these segments are turned on and off accordingly.

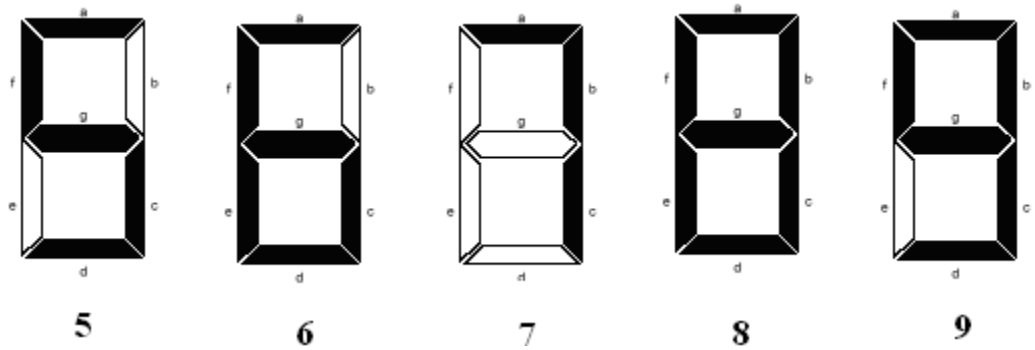
For example, digit 0 is displayed when segments **a, b, c, d, e, f, g** are lighted.



The following diagram shows digits 0 to 4 and shows which segments are lighted to display a particular decimal value.



The following diagram shows digits 5 to 9 and shows which segments are powered on to display a particular decimal value.



a) Draw the Function table from the above diagrams, showing what segments will be lighted when showing the expected digit, e.g. 0 is given as an example. (15%)

Digit	Segments
0	a, b, c, d, e, f
1	
2	
3	
4	
5	
6	
7	
8	
9	

b) From the table below you can see that segment **a** has logic 1 output for decimal values 0, 2, 3, 5, 6, 7, 8, 9.

Segment **b** has logic 1 output for decimal values 0, 1, 2, 3, 4, 7, 8, 9.

Complete the output for other segments in the following table. (15%)

	Inputs				**Outputs**						
	A	**B**	**C**	**D**	**a**	**b**	**c**	**d**	**e**	**f**	**g**
0	0	0	0	0	1	1					
1	0	0	0	1	0	1					
2	0	0	1	0	1	1					
3	0	0	1	1	1	1					
4	0	1	0	0	0	1					
5	0	1	0	1	1	0					
6	0	1	1	0	1	0					
7	0	1	1	1	1	1					
8	1	0	0	0	1	1					
9	1	0	0	1	1	1					
10	1	0	1	0							
11	1	0	1	1							
12	1	1	0	0							
13	1	1	0	1							
14	1	1	1	0							
15	1	1	1	1							

c) Explain how you create the combinational circuit for this 7 segment display (Hint-try to use Karnaugh Map) – 70%