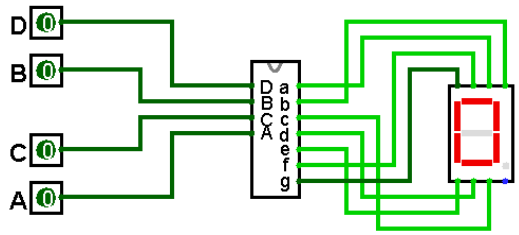
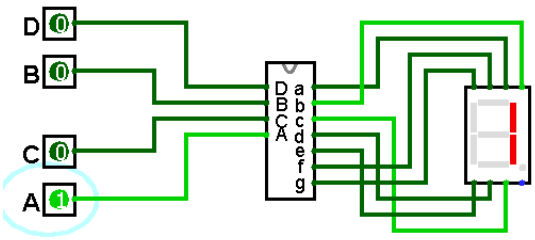
CS 20 Laboratory 6: Common Combinational Circuits

1. (4pts) In the experiment done on Section 2.1, provide a screenshot of the circuit for each possible input combination. Do not forget to label the inputs in the screenshots (0.25pts each).

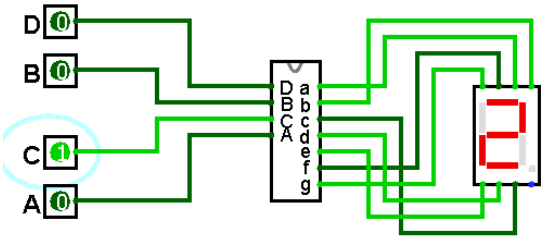
DBCA = 0000



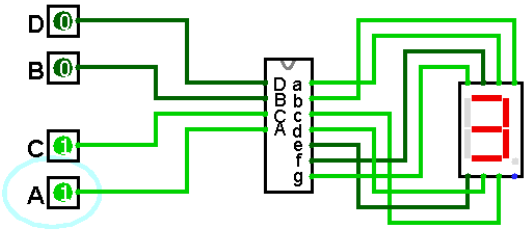
DBCA = 0001



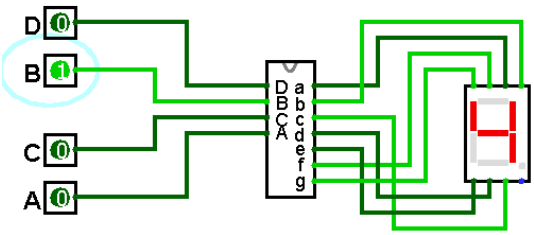
DBCA = 0010



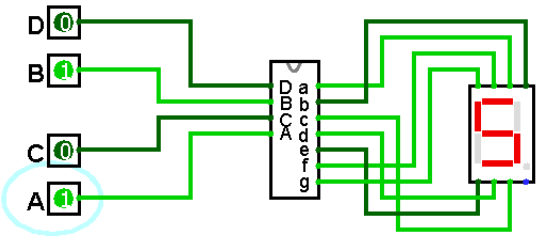
DBCA = 0011



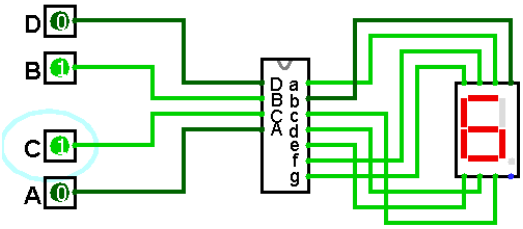
DBCA = 0100



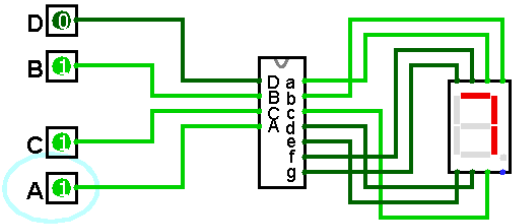
DBCA = 0101



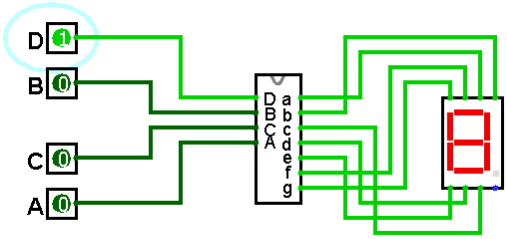
DBCA = 0110



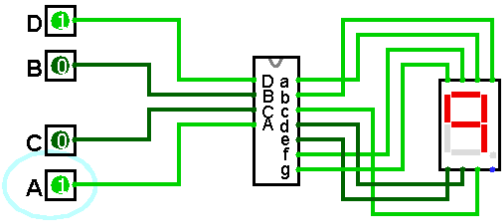
DBCA = 0111



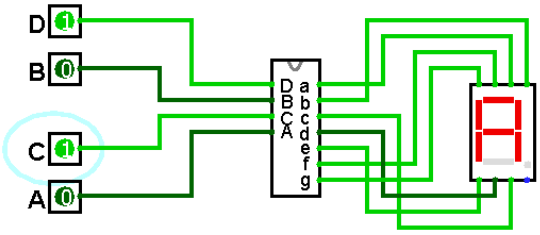
DBCA = 1000



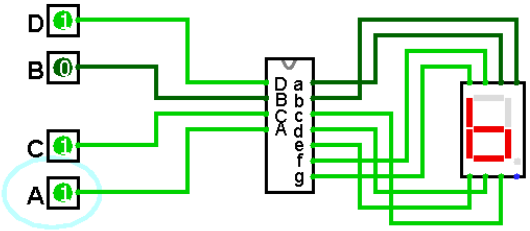
DBCA = 1001



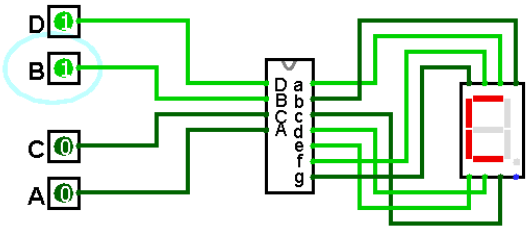
DBCA = 1010



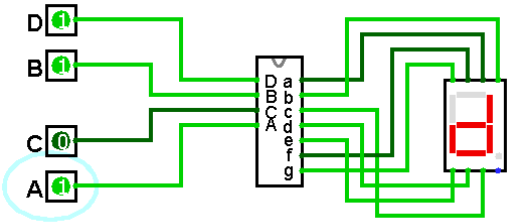
DBCA = 1011



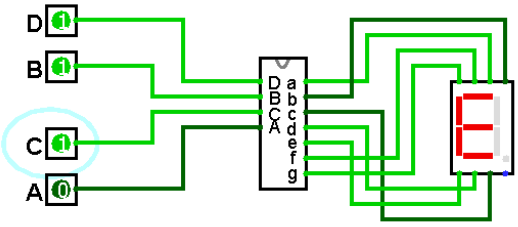
DBCA = 1100



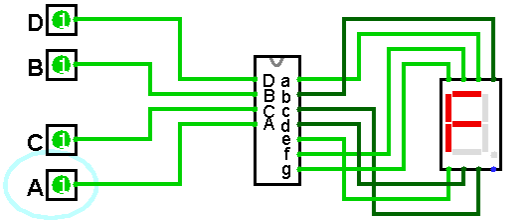
DBCA = 1101



DBCA = 1110



DBCA = 1111



2. Half Adder

   a. (2pts) Provide the boolean expression to represent the logic of the half adder.

      S = (AB')+(A'B)

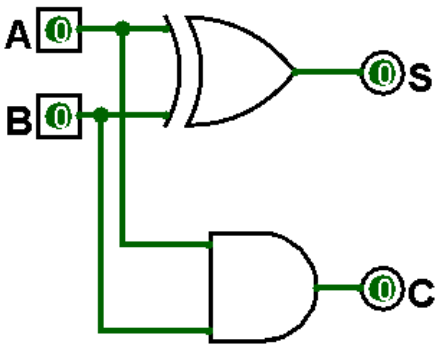
      C = AB

b. (1pt) Provide the truth table for the half adder.

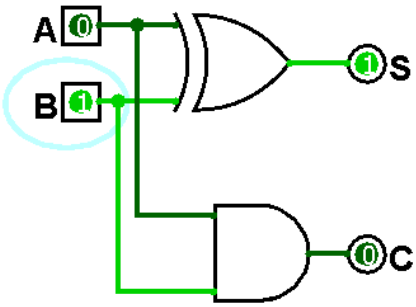
Input		Output	
A	B	S	C
0	0	0	0
0	1	1	0
1	0	1	0
1	1	0	1

c. (0.25pts each) Provide screenshots of the circuit for all possible input combinations. Do not forget to label the inputs in the screenshots.

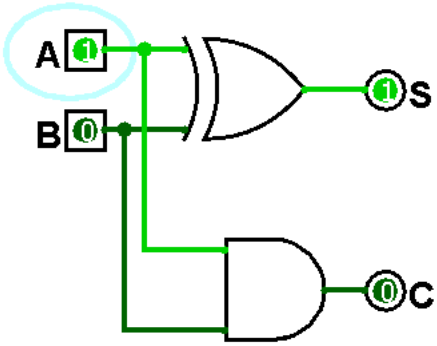
A = 0 B = 0



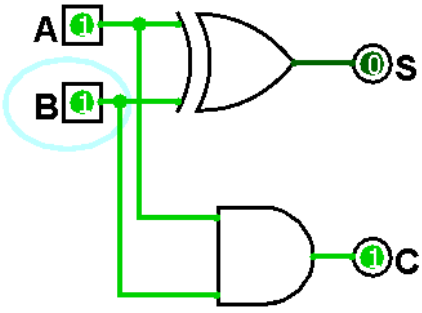
A = 0 B = 1



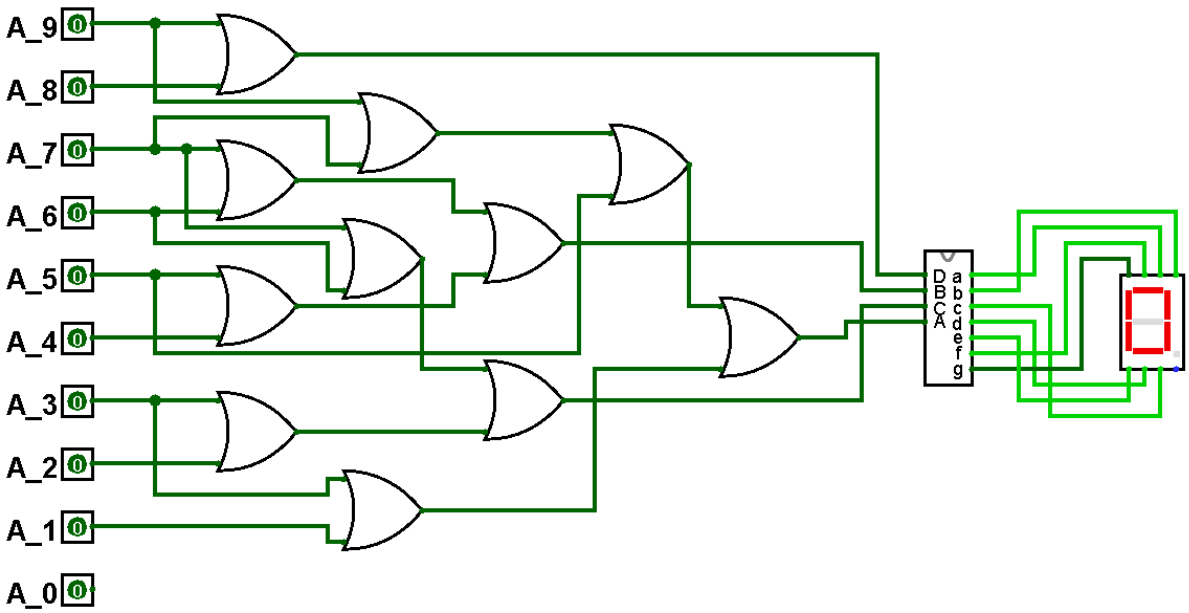
A = 1 B = 0



A = 1 B = 1

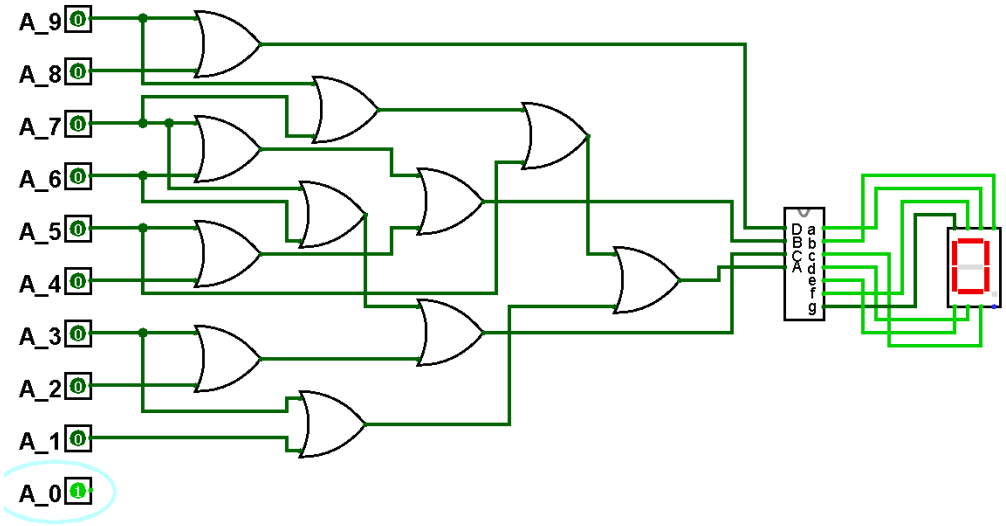


3. (2pts) Show a schematic diagram of the decimal-to-BCD encoder you created in Section 2.3.

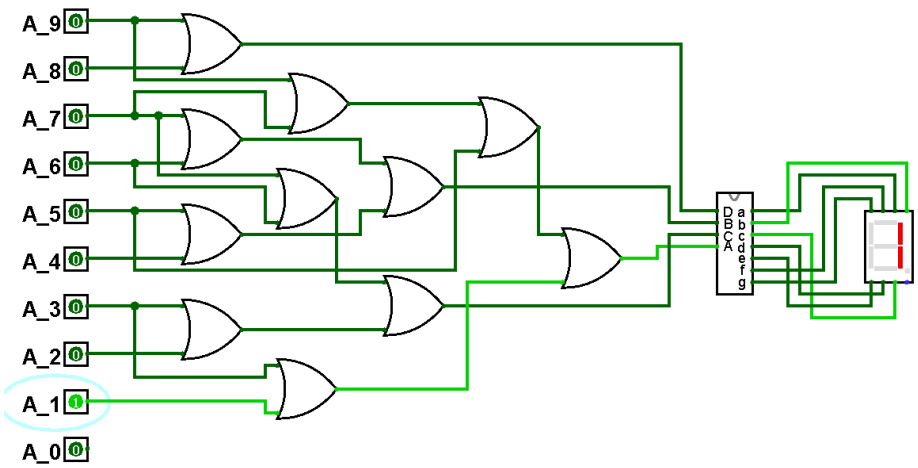


4. (4pts) In the experiment done on Section 2.3, provide screenshots of the circuit for each of the 10 possible input combinations where only a single input line is active (HIGH). Do not forget to label the inputs in the screenshots (0.25pts each).

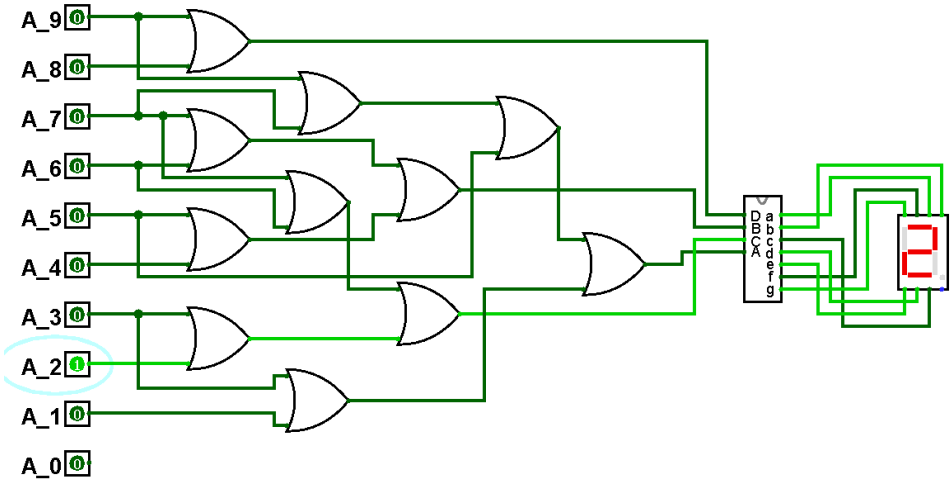
A_0 = 1



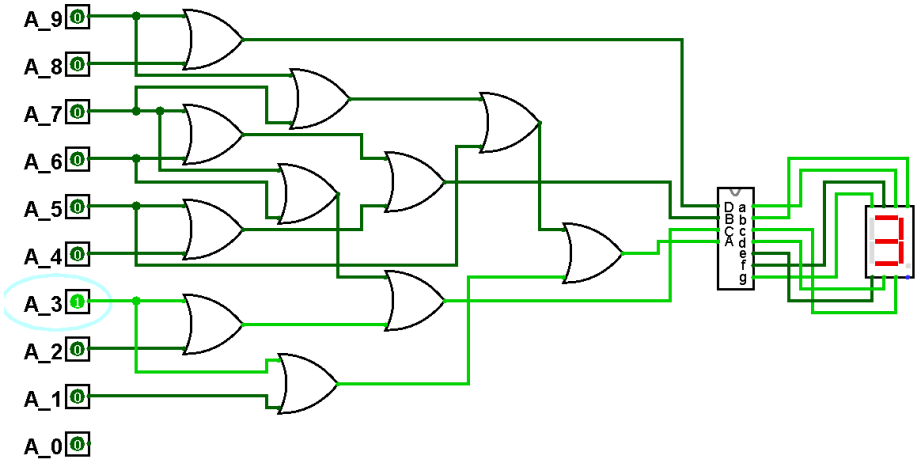
A_1 = 1


A_9
A_8
A_7
A_6
A_5
A_4
A_3
A_2
A_1
A_0
D
C
B
A
a
b
c
d
e
f
g

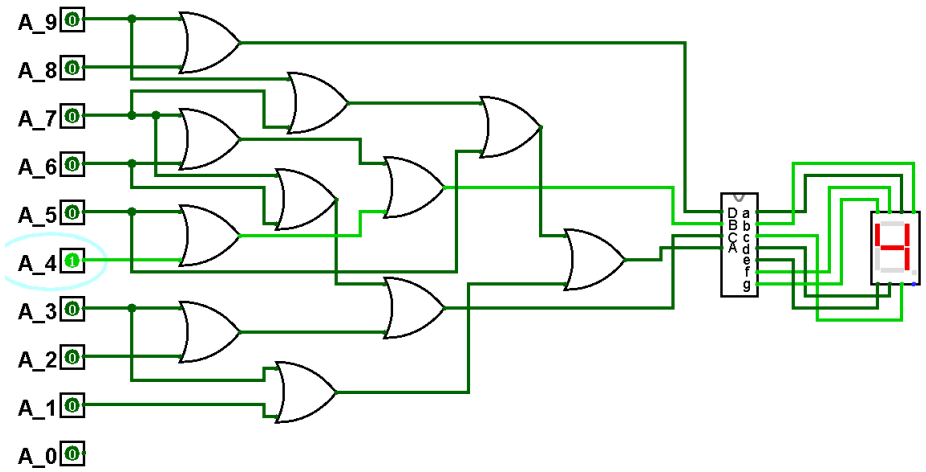
A_2 = 1


A_9
A_8
A_7
A_6
A_5
A_4
A_3
A_2
A_1
A_0
D
C
B
A
a
b
c
d
e
f
g

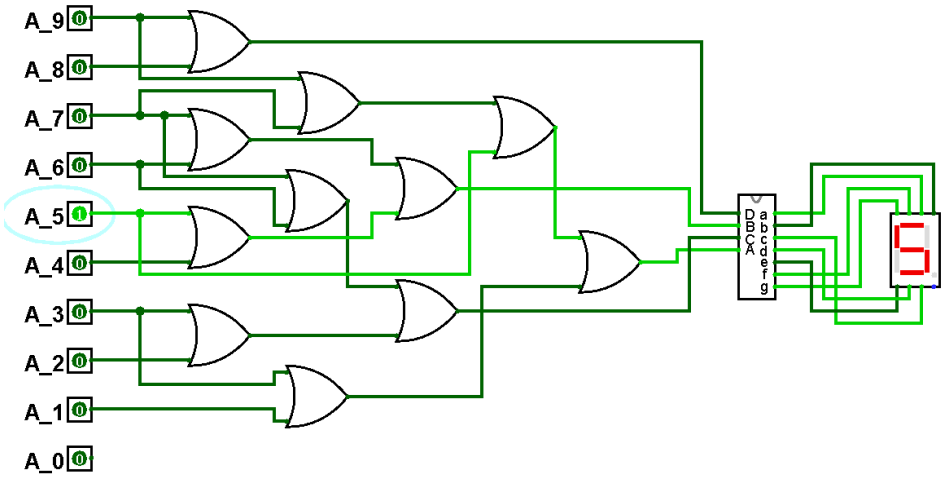
A_3 = 1


A_9
A_8
A_7
A_6
A_5
A_4
A_3
A_2
A_1
A_0
D
C
B
A
a
b
c
d
e
f
g

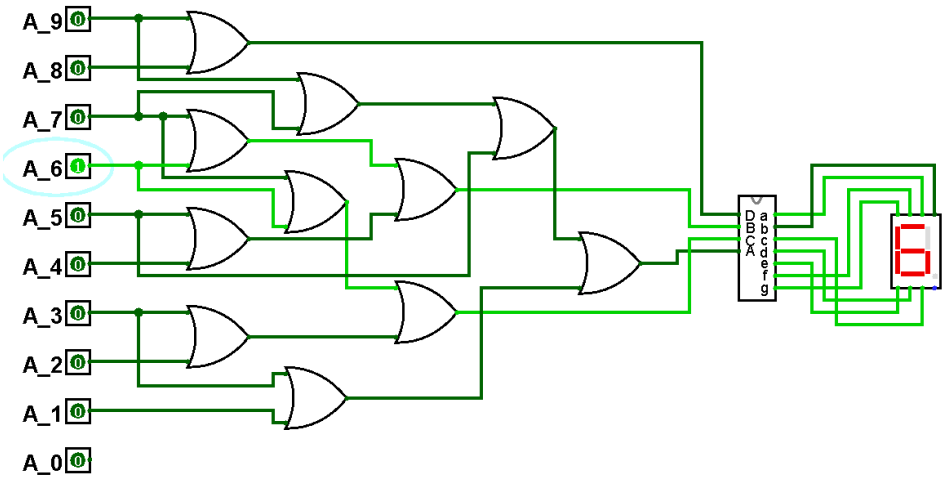
A_4 = 1


A_9
A_8
A_7
A_6
A_5
A_4
A_3
A_2
A_1
A_0
D
C
B
A
a
b
c
d
e
f
g
4

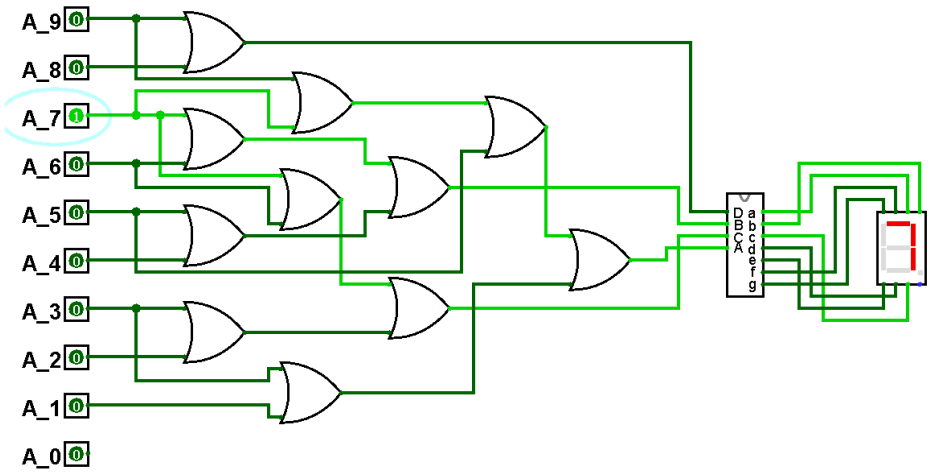
A_5 = 1


A_9
A_8
A_7
A_6
A_5
A_4
A_3
A_2
A_1
A_0
D
C
B
A
a
b
c
d
e
f
g
5

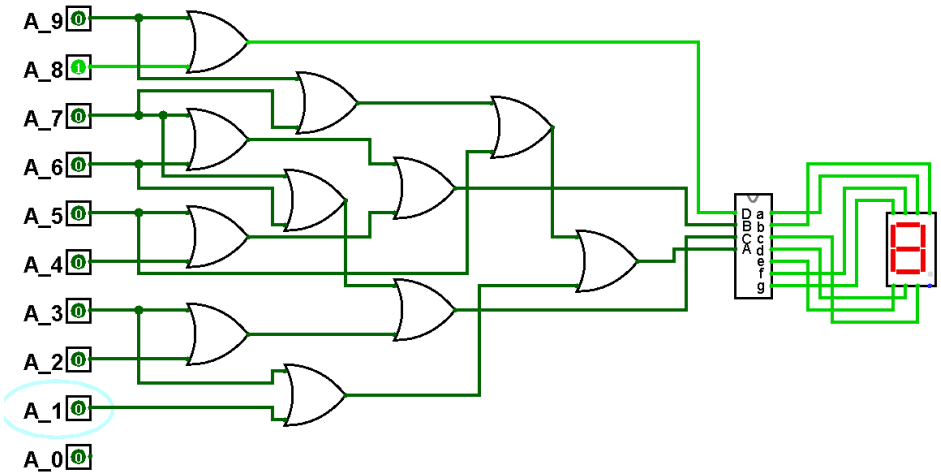
A_6 = 1


A_9
A_8
A_7
A_6
A_5
A_4
A_3
A_2
A_1
A_0
D
C
B
A
a
b
c
d
e
f
g
6

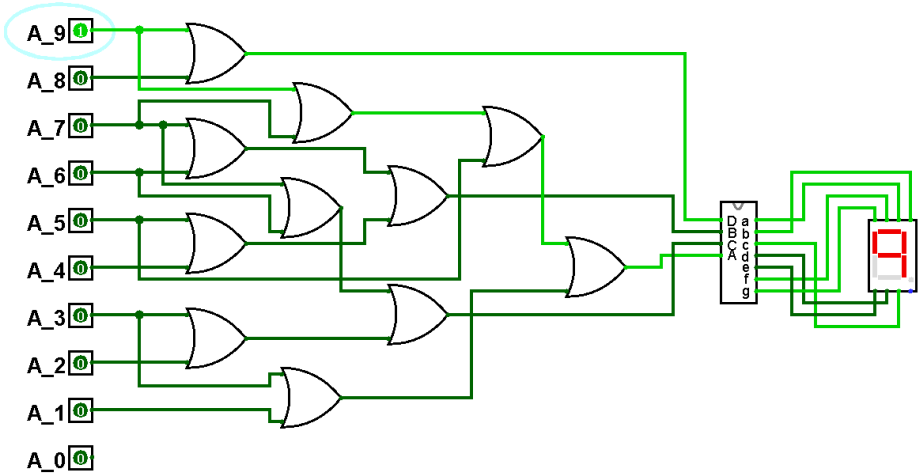
A_7 = 1


A_9
A_8
A_7
A_6
A_5
A_4
A_3
A_2
A_1
A_0
D
B
C
A
a
b
c
d
e
f
g

A_8 = 1


A_9
A_8
A_7
A_6
A_5
A_4
A_3
A_2
A_1
A_0
D
B
C
A
a
b
c
d
e
f
g

A_9 = 1


A_9
A_8
A_7
A_6
A_5
A_4
A_3
A_2
A_1
A_0
D
B
C
A
a
b
c
d
e
f
g