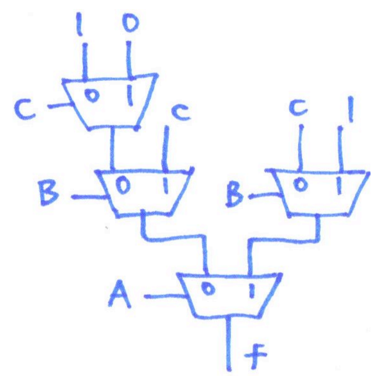
Recitation #7 Solutions

```
1.  10100
     1010
   + 1011
   ------
     0101
```

Overflow.

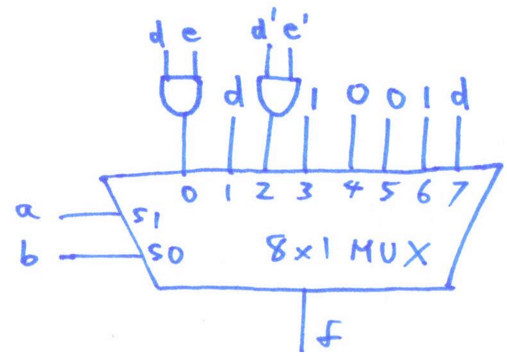
2. The truth table:

A	B	C	f	
0	0	0	1	c’
0	0	1	0	
0	1	0	0	c
0	1	1	1	
1	0	0	0	c
1	0	1	1	
1	1	0	1	1
1	1	1	1	

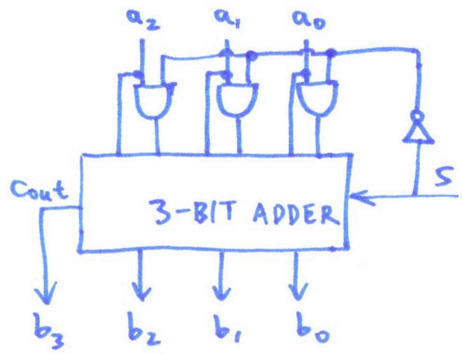


3. The truth table:

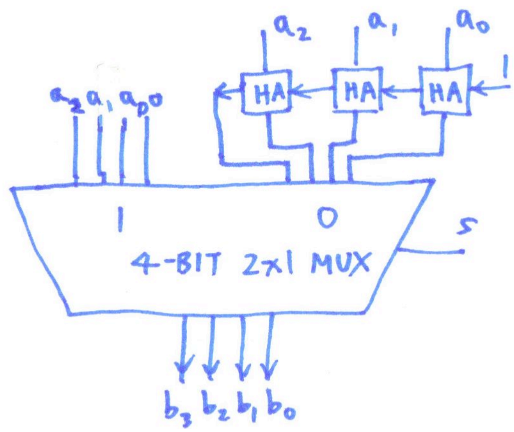
a	b	c	d	e	f	Index	
0	0	0	0	0	0	0	d.e
0	0	0	0	1	0	1	
0	0	0	1	0	0	2	
0	0	0	1	1	1	3	
0	0	1	0	0	d	4	d
0	0	1	0	1	0	5	
0	0	1	1	0	1	6	
0	0	1	1	1	1	7	
0	1	0	0	0	1	8	d’.e’
0	1	0	0	1	0	9	
0	1	0	1	0	0	10	
0	1	0	1	1	0	11	
0	1	1	0	0	1	12	1
0	1	1	0	1	d	13	
0	1	1	1	0	d	14	
0	1	1	1	1	1	15	
1	0	0	0	0	0	16	0
1	0	0	0	1	0	17	
1	0	0	1	0	0	18	
1	0	0	1	1	0	19	
1	0	1	0	0	d	20	0
1	0	1	0	1	0	21	
1	0	1	1	0	d	22	
1	0	1	1	1	0	23	
1	1	0	0	0	1	24	1
1	1	0	0	1	d	25	
1	1	0	1	0	d	26	
1	1	0	1	1	1	27	
1	1	1	0	0	0	28	d
1	1	1	0	1	0	29	
1	1	1	1	0	1	30	
1	1	1	1	1	1	31	



4. a. When S=0, B=A+A   +S
   When S=1, B=A+000 +S



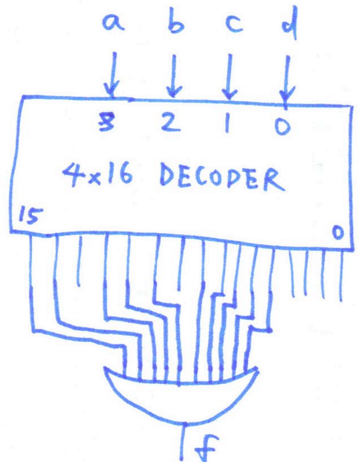
b. Note that 2A = a_2 a_1 a_0 0 (i.e., shifting A to right by 1 bit).
   Also, we can use 3 half adders to implement an add-one circuit.
   Then we can use the MUX to select the correct output based on S.



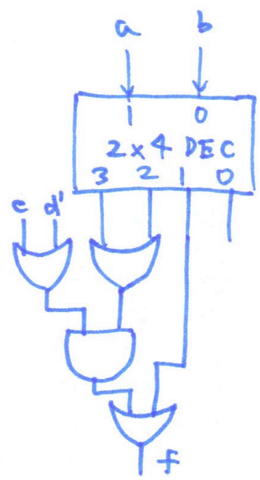
5. a.

a	b	c	d	f
0	0	0	0	0
0	0	0	1	0
0	0	1	0	0
0	0	1	1	0
0	1	0	0	1
0	1	0	1	1
0	1	1	0	1
0	1	1	1	1
1	0	0	0	1
1	0	0	1	0
1	0	1	0	1
1	0	1	1	1
1	1	0	0	1
1	1	0	1	0
1	1	1	0	1
1	1	1	1	1

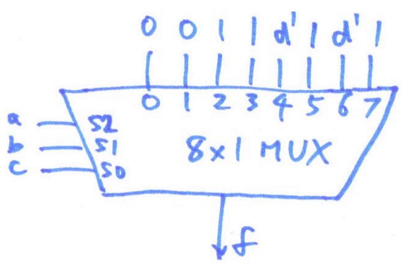
b.


a b c d
3 2 1 0
4x16 DECODER
15
0
f

c.


a b
1 0
2x4 DEC
3 2 1 0
c d'
f

d.


0 0 1 1 d' 1 d' 1
0 1 2 3 4 5 6 7
a
b
c
S2
S1
S0
8x1 MUX
f