# CMSC 311- Computer Organization

Fall 1995 - Assignment #2 (Solutions)

1 )

| X | Y | Z | F |
|---|---|---|---|
| 0 | 0 | 0 | 0 |
| 0 | 0 | 1 | 0 |
| 0 | 1 | 0 | 0 |
| 0 | 1 | 1 | 1 |
| 1 | 0 | 0 | 0 |
| 1 | 0 | 1 | 1 |
| 1 | 1 | 0 | 1 |
| 1 | 1 | 1 | 1 |

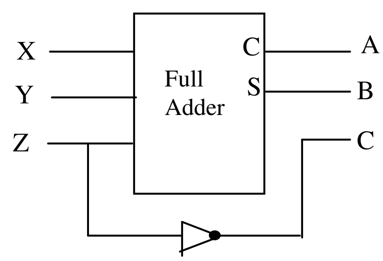
Y

| X | | **00** | **01** | **11** | **10** |
|---|---|---|---|---|---|
| | **0** | | | 1 | |
| | **1** | | 1 | 1 | 1 |

F = xy + xz + yz

2)

| x | y | z | a | b | c |
|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 | 1 |
| 0 | 0 | 1 | 0 | 1 | 0 |
| 0 | 1 | 0 | 0 | 1 | 1 |
| 0 | 1 | 1 | 1 | 0 | 0 |
| 1 | 0 | 0 | 0 | 1 | 1 |
| 1 | 0 | 1 | 1 | 0 | 0 |
| 1 | 1 | 0 | 1 | 0 | 1 |
| 1 | 1 | 1 | 1 | 1 | 1 |




A = xy + xz + yz

$B = x \oplus y \oplus z$

C = z’

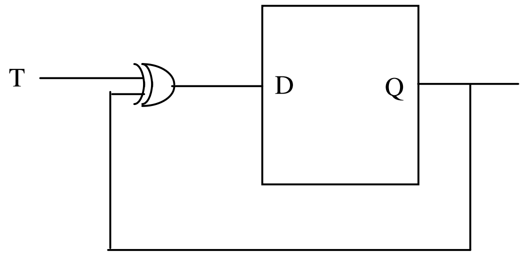
3) Let’s assume that the first floor is encoded as 00, the second as 01, the third as 10, and the fourth as 11. We denote the two inputs for the current floor as F0 and F1. The call button for the second floor is denoted B2, and the output to the elevator circuit as F. The output should then be:

| | | **00** | **01** | **10** | **11** |
|---|---|---|---|---|---|
| B2 | **0** | 0 | 0 | 0 | 0 |
| | **1** | 0 | 1 | 1 | 1 |

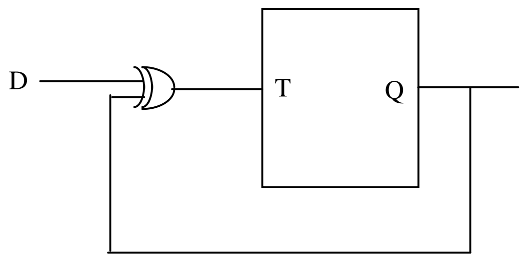
F = B2 F0 + B2 F1

NOTE: We can also take advantage of the semantics of an elevator to not output a 1 when the second floor is requested from the second floor. In this case, the output of the circuit becomes F = B2 F1.

4a.) From the equation in Mano (page 25):




b)

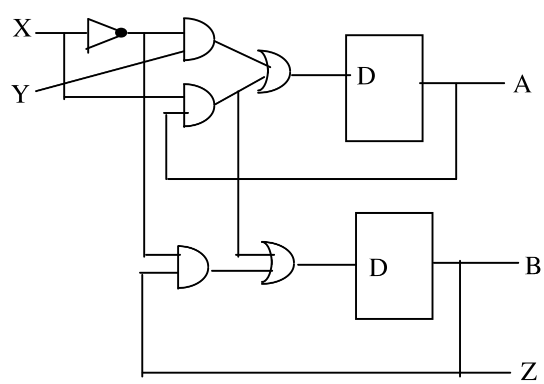



5.) Da = x’y + xa          Db = x’b + xa          z = b

b)

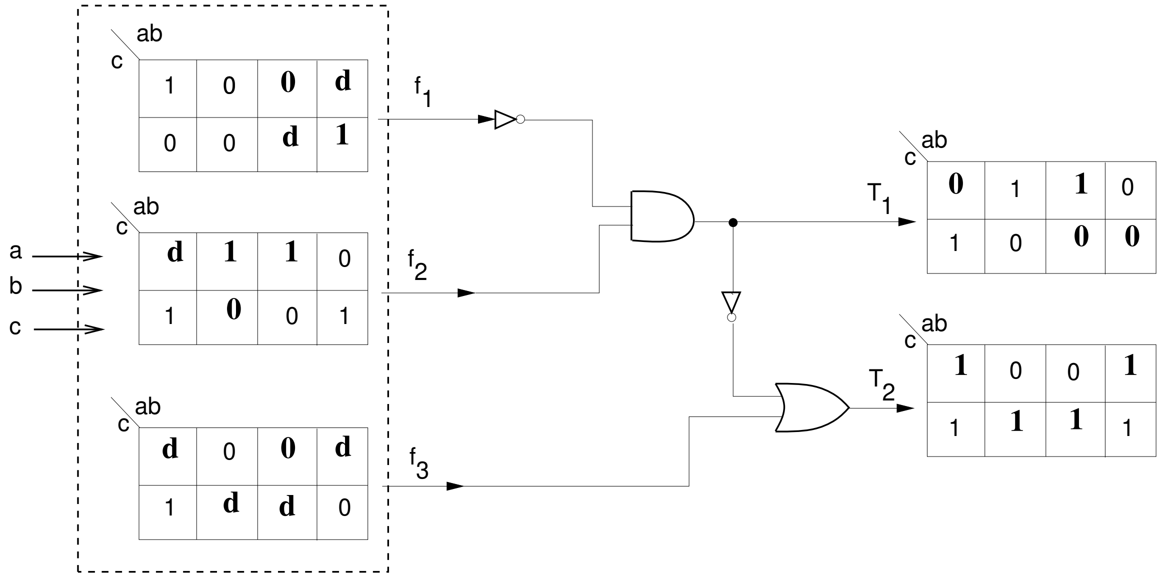
| A | B | X | Y | A | B | Z |
|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 1 | 1 | 0 | 0 |
| 0 | 0 | 1 | 0 | 1 | 0 | 0 |
| 0 | 0 | 1 | 1 | 0 | 0 | 0 |
| 0 | 1 | 0 | 0 | 0 | 1 | 1 |
| 0 | 1 | 0 | 1 | 1 | 1 | 1 |
| 0 | 1 | 1 | 0 | 0 | 0 | 1 |
| 0 | 1 | 1 | 1 | 0 | 0 | 1 |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 1 | 1 | 0 | 0 |
| 1 | 0 | 1 | 0 | 1 | 1 | 0 |
| 1 | 1 | 0 | 0 | 0 | 1 | 1 |
| 1 | 1 | 0 | 1 | 1 | 1 | 1 |
| 1 | 1 | 1 | 0 | 1 | 1 | 1 |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 |

a)




Note: clock not shown

6.)



ab
c
1 0 0 d
0 0 d 1
f1
ab
c
a
b
c
d 1 1 0
1 0 0 1
f2
ab
c
d 0 0 d
1 d d 0
f3
T1
ab
c
0 1 1 0
1 0 0 0
T2
ab
c
1 0 0 1
1 1 1 1