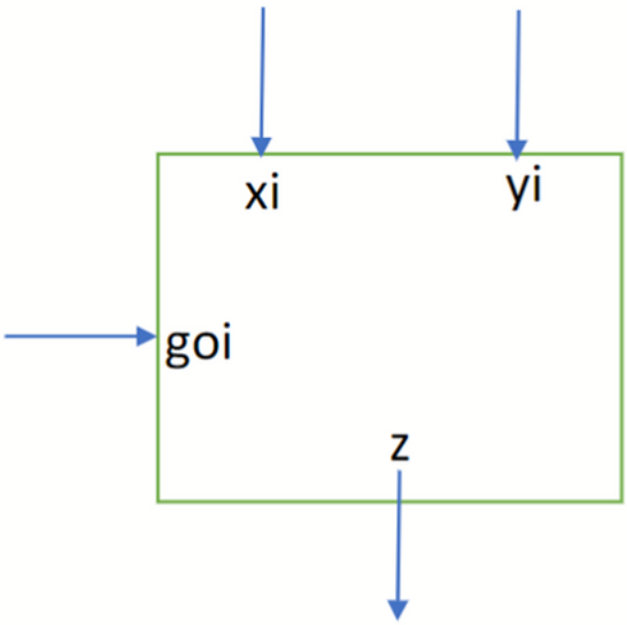
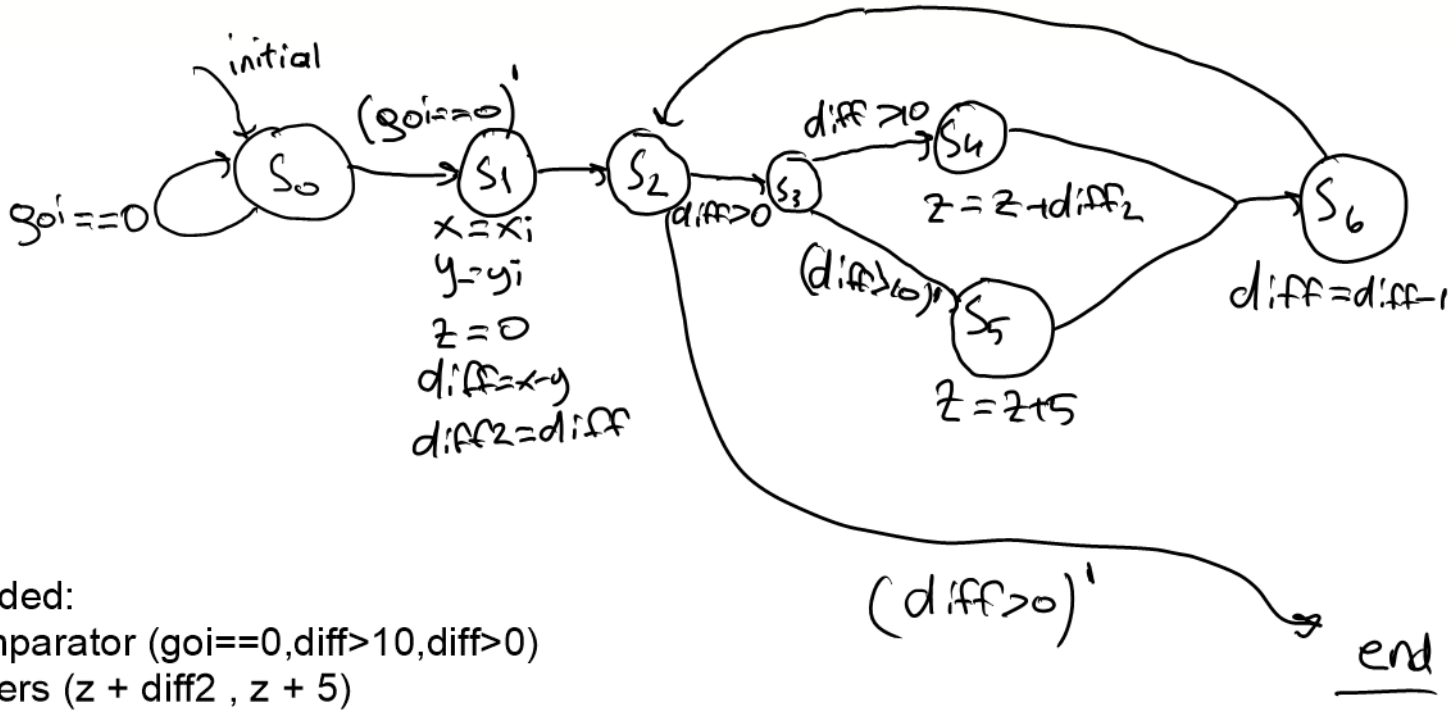
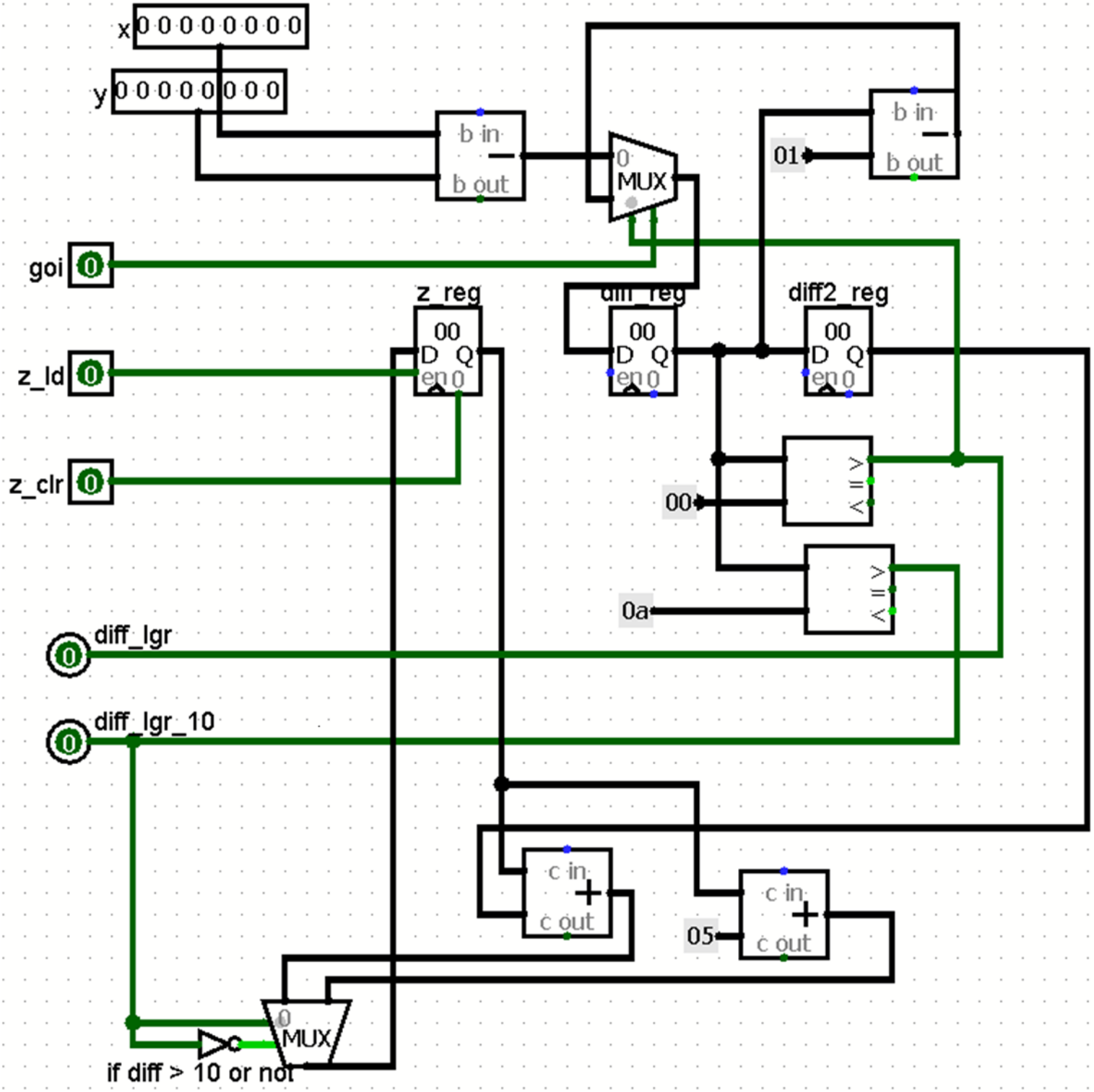
```
while(goi==0);
x = xi;
y = yi;
z = 0;
diff = x - y;
diff2 = diff;
while(diff > 0)
 {
    if (diff>10)
     {
       z = z + diff2;
     }
    else
     {
        z = z + 5;
     }
     diff = diff - 1;
  }
```



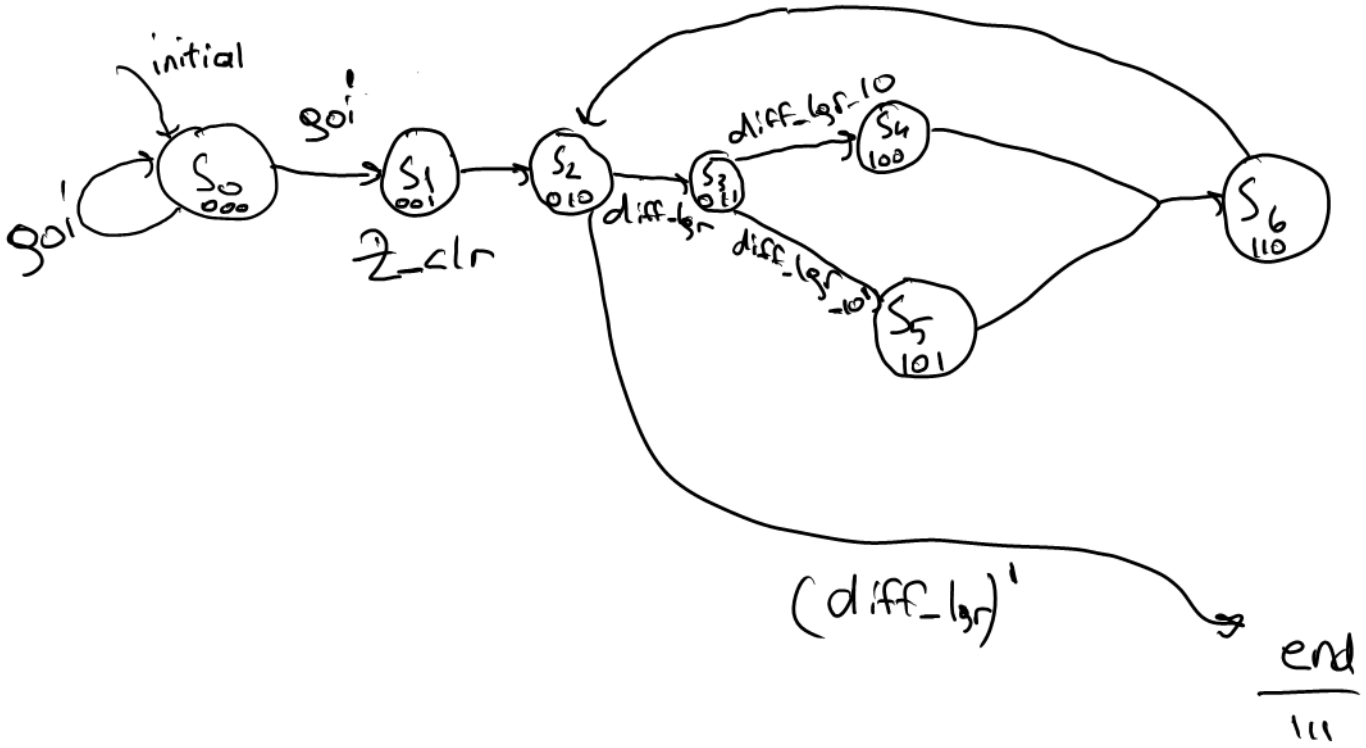




Needed:
Comparator (goi==0,diff>10,diff>0)
Adders (z + diff2 , z + 5)
Substracter (x-y , diff-1)
Registers(diff_reg,diff2_reg,z_reg)

# Datapath


x
0 0 0 0 0 0 0 0
y
0 0 0 0 0 0 0 0
b in
b out
0
MUX
01
goi
z_reg
diff_reg
diff2_reg
00
D Q
en 0
z_ld
z_clr
00
0a
diff_lgr
diff_lgr_10
c in
c out
05
if diff > 10 or not

# FSM




# Controller

8 state.

inputs: $S_2S_1S_0$, diff_lgr, diff_lgr_10

outputs: $n_2n_1n_0$, goi, z_ld, z_clr

| | $S_2$ | $S_1$ | $S_0$ | diff_lgr | diff_lgr_10 | $n_2$ | $n_1$ | $n_0$ | goi | z_ld | z_clr |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $S_0$ | 0 | 0 | 0 | 0 | 0 | | | | | | |
| | 0 | 0 | 0 | 0 | 1 | | | | | | |
| | 0 | 0 | 0 | 1 | 0 | | | | | | |
| | 0 | 0 | 0 | 1 | 1 | | | | | | |
| $S_1$ | 0 | 0 | 1 | 0 | 0 | | | | | | |
| | 0 | 0 | 1 | 0 | 1 | | | | | | |
| | 0 | 0 | 1 | 1 | 0 | | | | | | |
| | 0 | 0 | 1 | 1 | 1 | | | | | | |
| $S_2$ | 0 | 1 | 0 | 0 | 0 | | | | | | |
| | 0 | 1 | 0 | 0 | 1 | | | | | | |
| | 0 | 1 | 0 | 1 | 0 | | | | | | |
| | 0 | 1 | 0 | 1 | 1 | | | | | | |
| $S_3$ | 0 | 1 | 1 | 0 | 0 | | | | | | |
| | 0 | 1 | 1 | 0 | 1 | | | | | | |
| | 0 | 1 | 1 | 1 | 0 | | | | | | |
| | 0 | 1 | 1 | 1 | 1 | | | | | | |
| | 0 | | | | | | | | | | |
| | | | | | | | | | | | |
| end | | | | | | | | | | | |

$N_0$ time