

3) Convert the C code, which counts the number of elements less than x in array A consisting of 25 8-bit values into

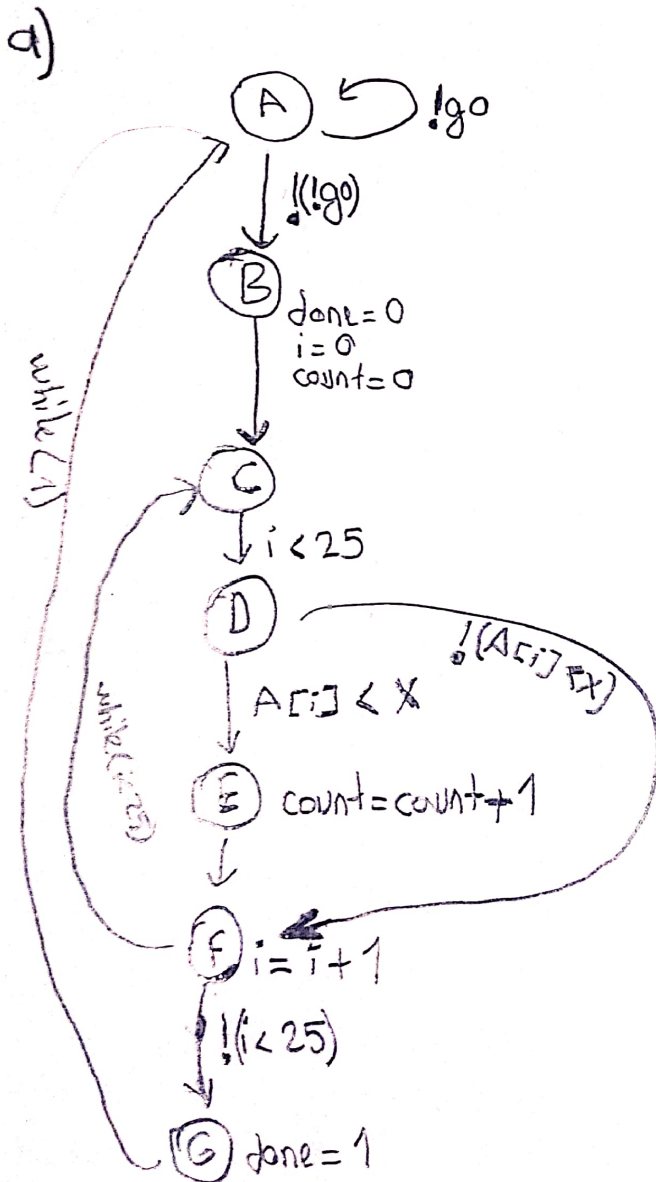
- A high level state machine
- Use the HLSM to create datapath
- Connect Datapath to controller.
- Create controllers FSM.

Inputs: byte $A[25]$, byte x ,
bit go

Outputs: byte count, bit done

Frequency:

```
while(1){
    while(!go);
    done = 0;
    i = 0;
    count = 0;
    while(i < 25){
        if (A[i] < x){
            count = count + 1;
        }
        i = i + 1;
    }
    done = 1;
}
```

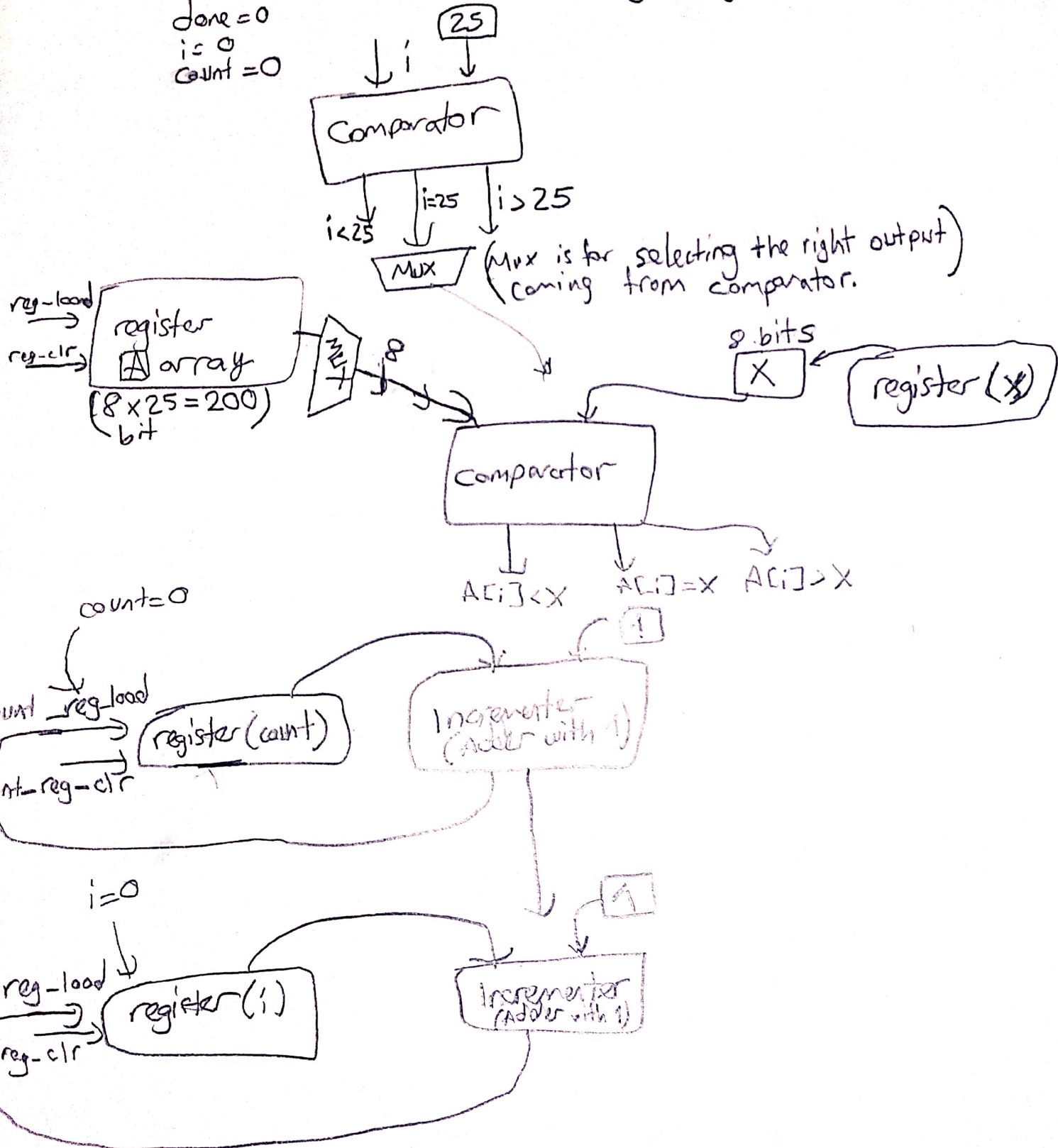


b) We need;

- 2 comparators ($i < 25$ and $A[i] < X$)
- 2 incrementers (count += 1 and $i = i + 1$) [adders]
- 4 registers (A array, count, i and X)

00011001 (Binary form)

done = 0
i = 0
count = 0

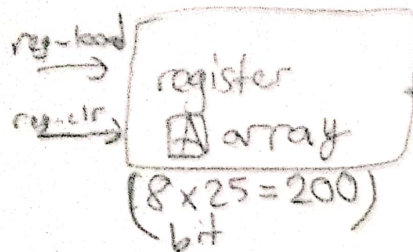
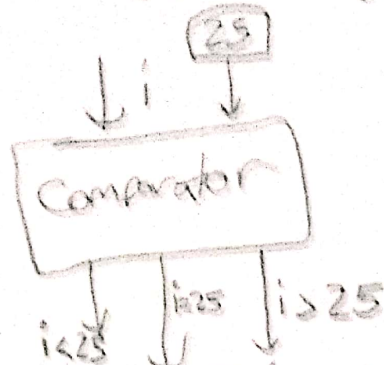


b) We need;

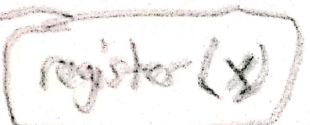
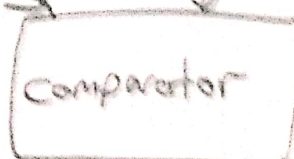
- 2 comparators ($i < 25$ and $A[i] < X$)
- 2 incrementers ($\text{count} \neq 1$ and $i \neq i+1$) [adders]
- 4 registers (A array, count, i and X)

00011001 (Binary form)

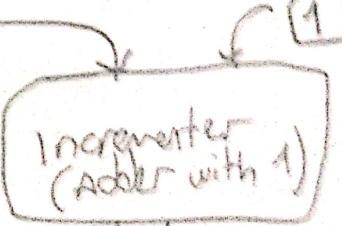
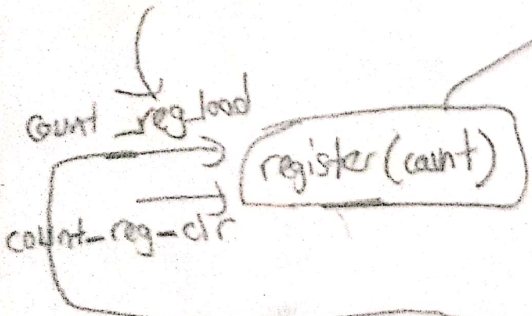
done = 0
i = 0
count = 0



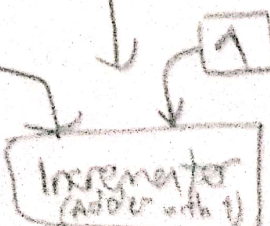
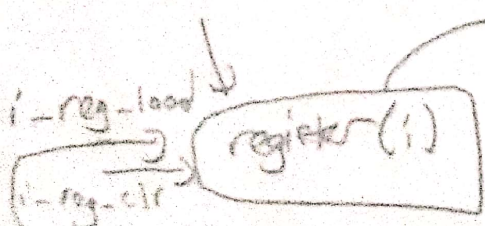
(MUX is for selecting the right output coming from comparator.)



count = 0



i = 0



c)

