Quiz session

1. Consider the transformation of binary regular registers to a M-valued regular register
   - Show that the algorithm does not work if we modify it so that the writer writes 0 to R[1], . . . , R[v – 1] in the ascending order
   - Show that the algorithm is not wait-free if we assume that R is an infinite array and any natural value can be written by the writer
2. Show that in Lamport's bakery algorithm, ticket numbers (labels) may grow without bound.
3. Show that the bakery algorithm is correct if if we replace atomic registers with safe ones

Binary -> M-valued (1WNR regular)

Code for process pi:

```
initially:
   shared array R[0,..M-1] of 1WNR registers := [1,0,…,0]

upon read()
   for j = 0 to M-1 do
    if R[j].read() = 1 then return j

upon write(v)  // if i=1
   R[v].write(1)
   for j=v-1 down to 0 do R[j].write(0)
   return ok
```


Bakery [Lamport'74,original]

```
// initialization
flag: array [1..N] of bool = {false};
label: array [1..N] of integer = {0}; //assume no bound

// code for process i that wishes to enter CS
flag[i] = true; //enter the doorway
label[i] = 1 + max(label[1], ..., lebel[N]); //pick a ticket
flag[i] = false; //exit the doorway
for j=1 to N do
   while (flag[j]); //wait until j is not in the doorway
   while (label[j]≠0 and (label[j],j)<<(label[i],i));
   // wait until j is not "ahead"
…
// critical section
…
label[i] = 0; // exit section
```