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Question1: Pseudo-code:

Variables:

```
wait_chairs    = 4    // number of waiting chairs
barber_chairs = 1    // number of barber chairs
bool is_sleep = true  // status of barber
wait_queue line // data structure
    capacity = wait_chairs + barber_chairs = 5
    peek()           // get first element without removing
    poll()           // remove first element
    offer(customer)  // add element to the queue
    empty()          // size = 0
    full()           // size = capacity
barber, wait, done // condition variables
m                // mutex
```

Method barber():

```
1  m.lock()
2  loop: // infinity loop
3      while line.empty() // wait for signal
4          is_sleep = true
5          wait(barber)
6          is_sleep = false
7          // cut line.peek()'s hair
8          signal(done) // finish cutting
9          signal(wait) // signal next
10         line.poll()  // customer leaves
11         m.unlock()
```

Method customer(num):

```
1  m.lock()
2  If line.full()    // customer enters
3      If is_sleep   // wake up barber
4          signal(barber)
5      line.offer(num) // start waiting
6      while line.peek() != num
7          wait(wait) // wait other customers
8          wait(done) // wait for cutting hair
9  else
10     // customer leaves immediately
11     m.unlock()
```