Exercises

We suggest you do these on your own. As with any homework problem, though, you may ask the TAs for help.

1. 3 processes are running simultaneously. 3 semaphores are used in these processes, which their initial values are : **S0 = 1, S1 = 0, S2 = 0**. In this situation, How many times does the process **P0** print number **0**?

```
Proccess P0                 Proccess P1             Proccess P2
while(true){                wait(S1);               wait(S2);
    wait(S0);               release(S0);            release(S0);
    print '0';
    release(S1);
    release(S2);
}
```

2. Discuss about implementing a monitor in a monitor.

3. Try to code wait() and signal() functions of the semaphore model in the Busy Waiting technique with the help of the test&set() function.

Solve these problems once with semaphores and once with monitors.

4. There is a bridge between two cities which has two lanes. These lanes are designed in different directions. Two cars can cross the bridge in different lanes simultaneously; however, if a truck wants to cross the bridge, it occupies both of the lines, so there must not be another car or truck on the bridge. Code the crossing algorithm of trucks and cars on this bridge.

5. In the last problem, Suppose that the bridge is long, and in total, **n** cars can drive on the bridge. Now modify your answer.

6. Now, consider a priority for trucks. That means if a truck is crossing the bridge, no other car can enter the bridge in either lane. So if a truck wants to cross the bridge, the remaining cars on the bridge have to exit at first, then the truck will cross, and after it has exited the bridge completely, the other cars can continue their path.