Exercises
Critical Section-Problem: Software-Solution

E-1: What is the difference between competing processes and cooperating processes?

E-2: Define Critical Section-Problem?

E-3: Consider a banking system app that maintains an account balance with two functions: deposit(amount) and withdraw(amount). These two functions are passed the amount that is to be deposited or withdrawn from the bank account balance. Assume that a husband and wife share a bank account. Concurrently, the husband calls the deposit() function and the wife calls withdraw(). Describe how a race condition is possible and how it can be done to prevent the race condition from occurring by using Peterson's algorithm.

E-4: List the requirements for mutual exclusion.

E-5: For the following software solution of 2 process Critical Section-Problem, how many out of three requirements for the critical-section problem are satisfied.

```
Shared variables flag [0] = flag [1] = 0;

Process_0( )              Process_1( )
Beginning section         Beginning section
flag[0]  = 1;                 flag[1]  = 1;
While (flag[1] == 1)      While (flag[0] == 1)
   Do nothing();             Do nothing();
<C.S.>                        <C.S>
flag[0]  = 0;                 flag[1]  = 0;
remaining section          remaining section
```

E-6: For the following software solution of 2 process Critical Section-Problem, how many out of three requirements for the critical-section problem are satisfied.

```
Shared variables flag [0] = flag [1] = 0;

Process_0()               Process_1()
Beginning section         Beginning section
While (flag[1] == 1)      While (flag[0]== 1)
   Do nothing():             Do nothing();
flag[0]  = 1;                 flag[1]  = 1;
<C.S.>                        <C.S>
flag[0]  = 0;                 flag[1]  = 0.
remaining section          remaining section
```

E-7: Peterson's algorithm for 2 process Critical Section-Problem, can be extended for 3 processes. List explicitly structure/code of process P0, P1, and P2. Prove that the algorithm satisfies all three requirements for the critical-section problem.