İstanbul Bilgi University

Department of Computer Engineering

SPRING, 2019

Campus: Santral

CMPE 312: OPERATING SYSTEMS

Exercise on synchronization

(Duration: minutes)

Name :

Student ID :

NOTE: WRITE NEATLY. MARKS WILL BE GIVEN FOR PARTIAL ANSWERS. THEREFORE, SHOW YOUR WORK AND YOUR REASONING. YOU MAY GET EXTRA POINTS FOR AN APPROPRIATE OBSERVATION OR YOU MAY LOSE SOME MARKS DUE TO AN OBSCURE SOLUTION.

1. In concurrent programming, a "critical section" is a part of a multi-process program that may not be concurrently executed by more than one of the program's thread. Let us consider a 2 processes solution:

```
do {
      flag[i] = TRUE;
      while(flag[j]); %wait
      CRITICAL SECTION
      flag[i] = FALSE;
      REMAINDER SECTION
      } while (TRUE);
Pseudo-code of $P_i$ (the one of $P_j$ is symmetric)
```

(a) {50 points} Is the given solution working? Prove it or disprove it:

- {10 points} Does the given solution sattisfy the mutual exclusion requirement? Explain (a simple 'yes-no' answer is NOT enough. What is the mutual exclusion requirement? Why is (not?) sattisfied?)
- {10 points} Does the given solution sattisfy the progress requirement? Explain.
- {10 points} Does the given solution sattisfy the bounded waiting requirement? Explain.
- {20 points} Make a simulation to support your answer.

(b) {50 points} If your answer to the previous question is negative, how can you modify the given solution to make it working?