Sample Questions

CS 247: Principles of Distributed Computing
Spring 2020

1.
Modules can have a periodic block that is executed regularly in definite intervals. Just as an example, a component can periodically check the value of a variable v to reset the value of a set s.

```
upon periodic
   if (v == 1)
     s = ∅
```

Modify the reliable broadcast algorithm such that it does not use the failure detector.
Draw execution diagrams that shows the difference of the two algorithms.

2.
Modify the uniform reliable broadcast algorithm such that it does not use the failure detector but assumes that a majority of processes are correct.

3.
Can we devise a causal broadcast algorithm that ensures only the nonuniform variant of causal order property: “No correct process p delivers a message m2 unless p has already delivered every message m1 such that m1 $\rightarrow$ m2 ?”

4.
For the regular register algorithm that assumes a majority of the processes are correct, draw an execution diagram that shows that if a process does not keep a local copy of the state, then regularity is violated.

6.
Consider Algorithm III (uniform consensus with eventually perfect failure detector). Assume that the process 0, which is the leader of the initial epoch, is correct. How can we simplify the algorithm so that it uses fewer communication rounds?