Exercise Session 9
Non-blocking Atomic Commit

Problem 1

Devise two algorithms that, without consensus, implement weaker specifications of NBAC by replacing the termination property with the following ones:

- Weak termination: Let p be a distinguished process, known to all other processes. If p does not crash then all correct processes eventually decide. Your algorithm may use a perfect failure detector.

- Very weak termination: If no process crashes, then all processes decide. Is a failure detector needed to implement this algorithm?

Problem 2

Consider a variant of NBAC where we replace the Agreement property (i.e., No two processes decide differently) with **Non-uniform Agreement** (i.e., No two *correct* processes decide differently).

In Figure 1 below, there are three processes and their corresponding timeline. Using the same notation as you saw in the class, depict on this figure an execution where each of the three processes proposes an initial value using NBAC and the execution satisfies this variant of NBAC with Non-uniform Agreement, but does not satisfy the conventional NBAC specification (with Agreement).

p1 ———————————————————————————→

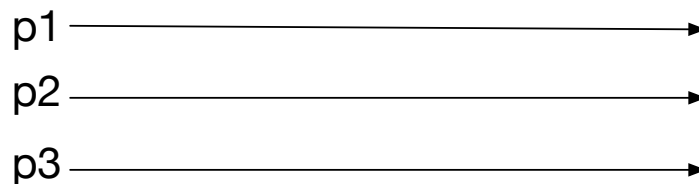p2 ———————————————————————————→

p3 ———————————————————————————→

Figure 1: Show on this figure the Proposal events, any Decision events, and any process crash events, such that the execution satisfies NBAC with Non-uniform Agreement (but not with Agreement).

Explain why does your execution break the Agreement property.