CS 425/ECE 428 Distributed Systems Homework 5 Total points: 30

into Compass only once. A single submission will be enabled for future homework as well.

You will be able to upload your submission for Homework 5

Due by 7 pm on March 17, 2018

Homework 5 is granted a longer extension due to the Spring Break – in particular, the extension without penalty is till 7 pm on March 26, 2018.

Note that Homework 6 may also be due during the week after Spring Break.

1. (10 points) Suppose that the Ricart-Agrawala algorithm for mutual exclusion is implemented incorrectly: the algorithm labels requests with (process id, Lamport timestamp) rather than with (Lamport timestamp, process id). The rest of the algorithm remains unchanged. Does this algorithm still satisfy (a) safety and (b) liveness?

Answer YES or NO, with a brief explanation.

2. (10 points) Suppose that we want to achieve **Byzantine Consensus** in a synchronous system, while satisfying the following properties, in addition to the termination property.

Assume that each process has an input in the set $\{0,1,2,3\}$.

- Validity: The decision (output) must equal the input of some non-faulty process.
- Agreement: All non-faulty processes must reach the same decision (i.e., output).

Does there exist a Byzantine Consensus algorithm for 4 processes that can tolerate 1 Byzantine failure?

Answer YES or NO. If you answer NO, explain why.

SUGGESTED EXERCISE: Design an algorithm for the above problem that tolerates 1 failure (assume the smallest number of processes for which you are still able to find an algorithm).

3. (10 points) In the Bakery algorithm, delete all the lines of code thay use the "choosing" variable. Will the algorithm still work correctly? If you answer NO, provide a counter-example.