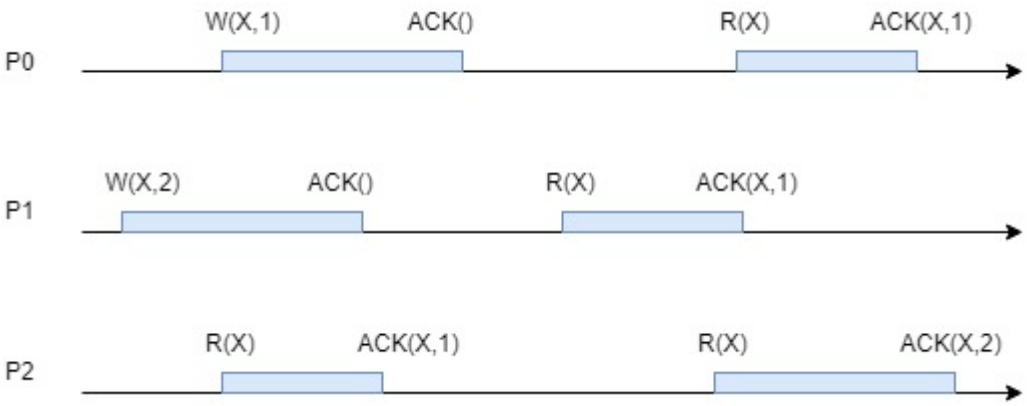
CS 425/ECE 428 Distributed Systems
Homework 4 **Total points: 30**
Due by 5 p.m. on February 22, 2018.
Submit electronically via Compass2g. **PDF format preferred.**

(1) (10 points) In each part of this question, if you answer NO, **briefly explain why** the execution does not satisfy the specified property.

Assume that all variables are initialized to 0

a. Does the execution below satisfy **causal** consistency? (5 points)

b. Does the execution below satisfy **causal** consistency? (5 points)



(2) (10 points) Consider any one of the two algorithms discussed in the class for tolerating f crash failures in a synchronous system. Recall that the algorithm performs f+1 rounds in total.

In this question, assume that f divisible by 3.

Suppose that in a particular system it is guaranteed that, during any given round, either no process crashes, or exactly 3 processes crash. Also, at most f processes may crash during the entire execution.

Under the above assumptions, **determine the minimum number of rounds** that suffice to achieve consensus using the above algorithm (i.e., instead of f+1 rounds in the original algorithm).

Explain your answer briefly.

(3) (10 points) Consider the approximate consensus algorithm discussed in Lecture (see the notes provided for this algorithm). Suppose that f = 2 (i.e., at most 2 process or node may crash). Suppose that the system contains 5 nodes, with inputs 1, 2, 3, 4, and 5 respectively.

After one round of the approximate consensus algorithm, determine the **largest** and the **smallest** value that the local variable y may take at any of these nodes.

Show your work.