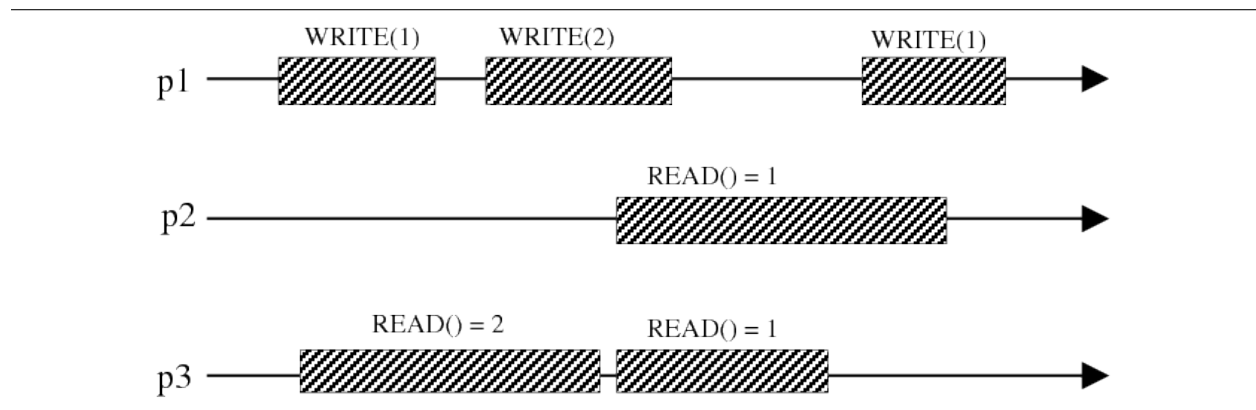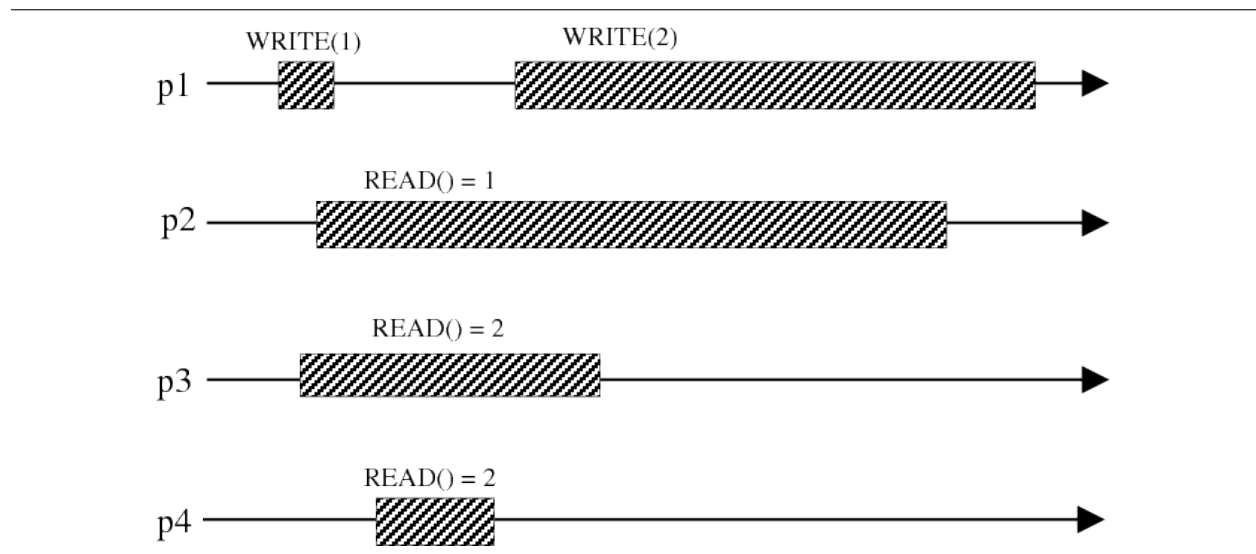# Exercise 1

Problem 1.   Each of the following executions represents a run of an algorithm that implements a read/write register. For each execution:

- Specify whether the execution is: *atomic*, *regular*, *safe*, or *none-of-the-above*. Explain why this is the case.

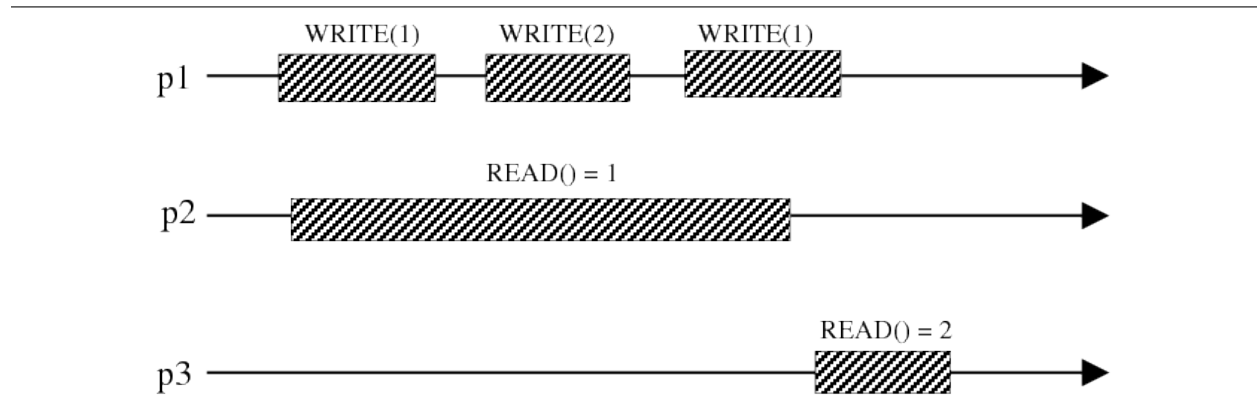- If the execution is atomic, draw in the serialization points.

Part 1.a.

Part 1.b.

Part 1.c.

Problem 2. Consider the transformation from binary MRSW regular registers to M-valued MRSW regular registers. Prove that the transformation does not work for atomic registers. In other words, assuming that we have binary MRSW atomic registers, show that the transformation does not provide M-valued MRSW atomic registers.

Problem 3. Consider the transformation from binary SRSW safe to binary MRSW safe registers given in class. Prove that the transformation works for multi-valued registers and regular registers. Also, prove that the transformation does not work for atomic registers (by providing a counterexample that breaks atomicity).

Problem 4. Consider the transformation from binary MRSW safe registers to binary MRSW regular registers, given in class. Prove that the transformation does **not** generate multi-valued MRSW regular registers (by providing a counterexample that breaks regularity). Also, prove that the resulting registers are not binary atomic (by providing a counterexample that breaks atomicity).