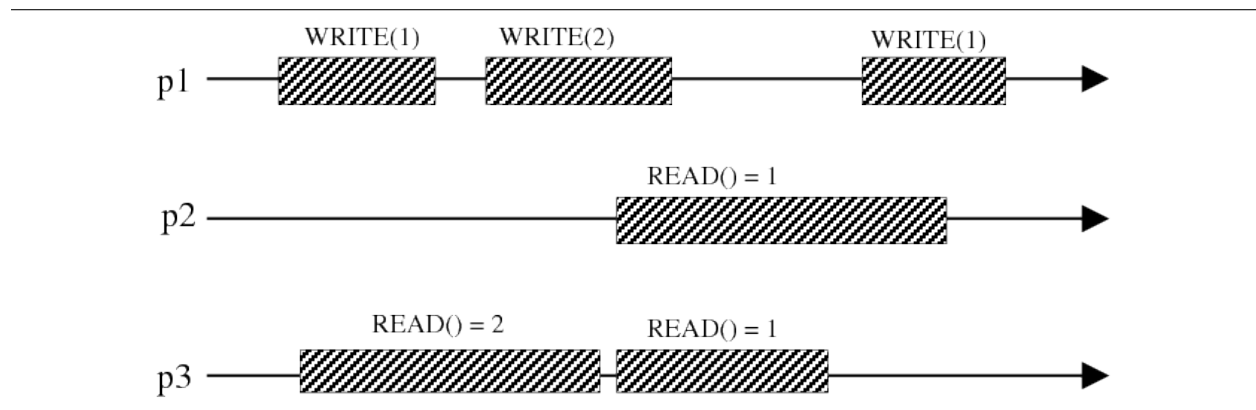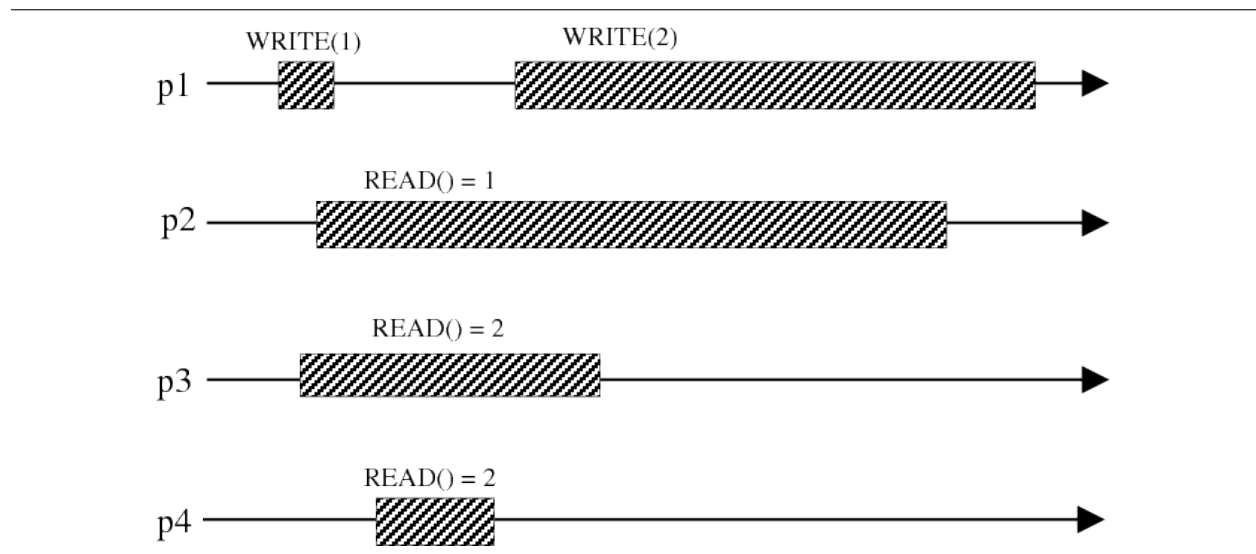# Exercise 1

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.

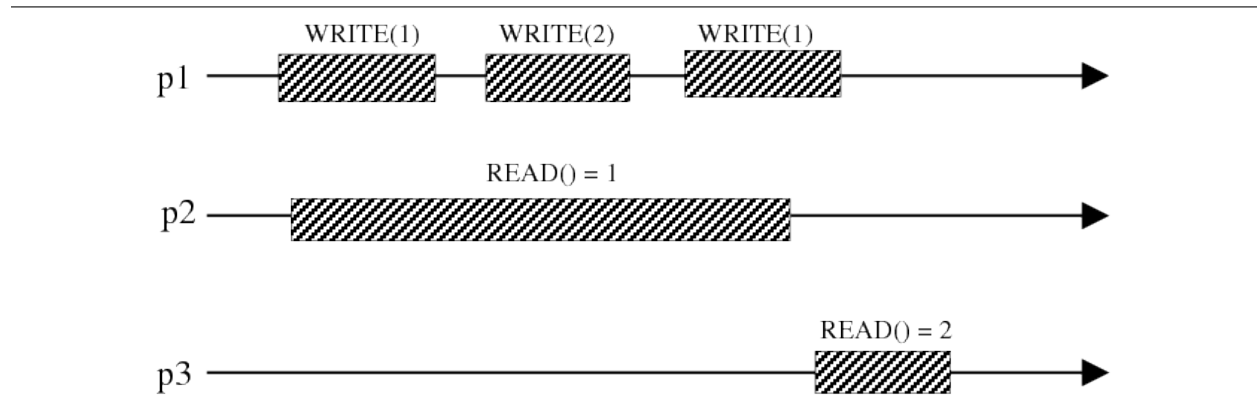- If the execution is atomic, draw in the serialization points.

Part 1.a.

Part 1.b.

Part 1.c.

Problem 2. Consider the transformation from binary 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 3. 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).

Problem 4. Consider the transformation from binary regular to M-valued MRSW regular registers given in class. Prove that:

1. The resulting registers are regular.

2. The transformation would not work if the Write operation would first write 0, and then 1. (You should provide a counterexample that breaks regularity.)

3. The resulting registers are not atomic. (You should provide a counterexample execution that breaks atomicity.)