

Quiz 1

Problem 1: One-shot atomic snapshot

Prove that one-shot atomic snapshot satisfies the properties of *self-inclusion* and *containment*:

- Self-inclusion: $\forall i : v_i \in S_i$;
- Containment: $\forall i, j : S_i \subseteq S_j$ or $S_j \subseteq S_i$.

Recall that S_i is the set of non- \perp values obtained by p_i from the snapshot operation.

Problem 2: Peterson's lock

Consider the following simplified variant of Peterson's 2-process mutual exclusion algorithm:

Shared atomic variables:

```
flag[0], flag[1]: boolean atomic registers
turn: atomic register
```

Code for process p_i ($i=0,1$):

```
flag[i] := true
turn := 1-i
if (flag[1-i]) and (turn=1-i) then
    return false // failure
else
    return true // critical section
```

Draw the complex of states reachable by the two processes after they complete the algorithm.