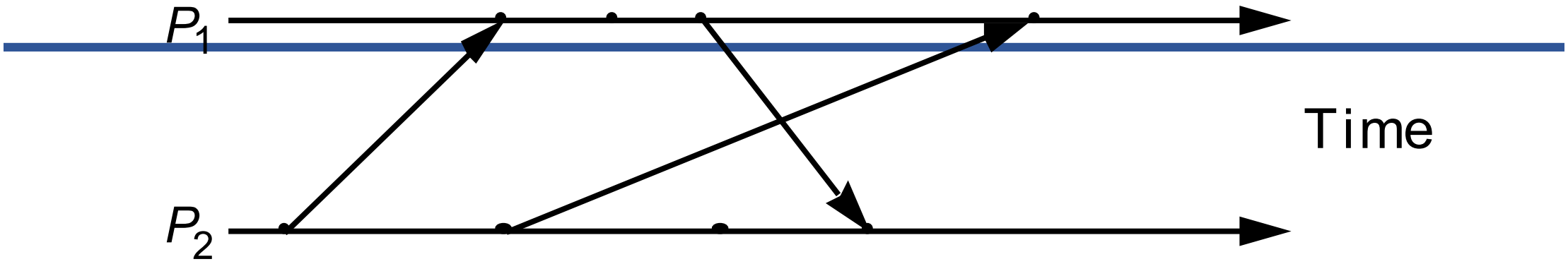
Tutorial week 5

Question 1

- Two processes *P* and *Q* are connected in a ring using two channels, and they constantly rotate a message *m*. At any one time, there is only one copy of *m* in the system. Each process's state consists of the number of times it has received *m*, and *P* sends *m* first. At a certain point, *P* has the message and its state is 101. Immediately after sending *m*, *P* initiates the snapshot algorithm. Explain the operation of the algorithm in this case, giving the possible global state(s) reported by it.

Question 2



- The figure above shows events occurring for each of two processes, *p*1 and *p*2. Arrows between processes denote message transmission.
- Draw and label the lattice of consistent states (*p*1 state, *p*2 state), beginning with the initial state (0,0).

Question 3

- Jones is running a collection of processes $p_1, p_2, \ldots, p_N$. Each process p_i contains a variable v_i. She wishes to determine whether all the variables $v_1, v_2, \ldots, v_N$ were ever equal in the course of the execution.

  (i) Jones' processes run in a synchronous system. She uses a monitor process to determine whether the variables were ever equal. When should the application processes communicate with the monitor process, and what should their messages contain?

  (ii) Explain the statement *possibly* ($v_1 = v_2, = \ldots = v_N$). How can Jones determine whether this statement is true of her execution?