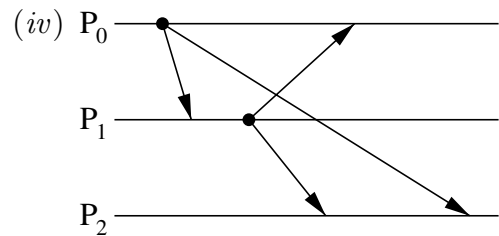
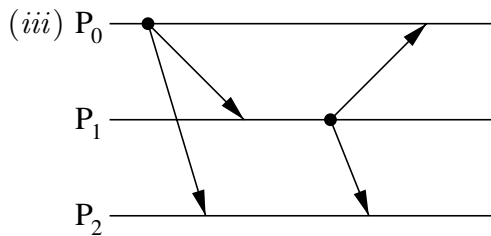
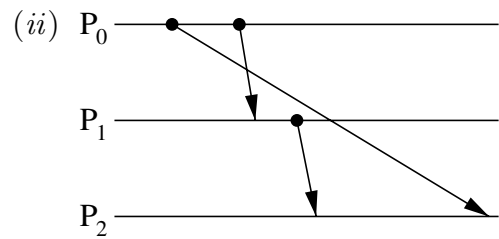
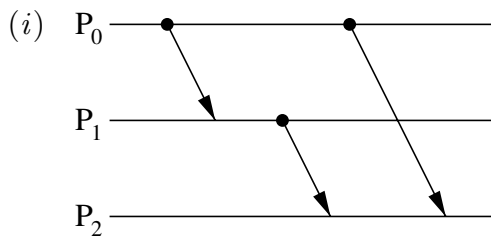


2001 Paper 13 Question 1

Distributed Systems

- (a) Explain the problem of clock drift in distributed systems. [2 marks]
- (b) What sources of conventional earth time might be used by computer systems? How would you estimate bounds on the accuracy of time received from such a source? [4 marks]
- (c) What constraint does distributed inter-process communication (IPC) impose on the clock values of the communicating parties? [1 mark]
- (d) Outline one clock synchronisation protocol that satisfies this constraint. [4 marks]
- (e) For each of the cases of IPC illustrated below, give the vector clock values that message receiving and delivery modules could maintain for each process.



[6 marks]

- (f) Define “causal order” of message delivery. In which, if any, of (i) to (iv) above is causal order violated at the message receiving module? [3 marks]