COMPUTER SCIENCE TRIPOS Part IB – 2020 – Paper 5

7 Concurrent and Distributed Systems (djg11)

(a) What are the distinguishing differences between a process and a thread? How are they best mapped to processors? [4 marks]

(b) (i) What are the main features of a *monitor* in concurrency theory? [2 marks]

(ii) How can a thread suspend itself inside a monitor? Use a state diagram or flow chart to explain your answer. [5 marks]

(c) Define *priority inversion* and give an example of a situation where it may occur. [3 marks]

(d) Several threads split over several processes all write lines of text to one output device. Characters from different lines must not be interleaved. The processes have different priorities. Outline the major software components (such as processes, threads, buffers, locks and system calls) involved in this task and how they interact. Identify the points where threads will block and examine whether priority inversion is likely to happen. [6 marks]