COMPUTER SCIENCE TRIPOS Part II – 2015 – Paper 9

12 Topics in Concurrency (JMH)

(*a*) Define when a relation R is a *(strong) bisimulation* and define *bisimilarity*. [3 marks]

(*b*) Let the pure CCS processes P and Q be

$$P \stackrel{\text{def}}{=} a.Q \qquad\qquad Q \stackrel{\text{def}}{=} b.P$$

(*i*) Show that: $a.b.P + b.a.Q \sim P + Q$ [4 marks]

(*ii*) Use the local model checking algorithm to show that

$$P \vdash \nu X(\langle\cdot\rangle T \wedge [\cdot]X)$$

reduces to **true** [4 marks]

(*iii*) Given that $a.(b.nil + Q) \vdash \nu X(\langle\cdot\rangle T \wedge [\cdot]X)$ reduces to **false**, are P and $a.(b.nil + Q)$ bisimilar? State carefully but do not prove any results upon which your answer relies. [3 marks]

(*c*) Explain how bisimilarity $\sim$ is a greatest fixed point. State carefully but do not prove any results upon which your answer relies. [6 marks]