Topics in Concurrency

(a) Define what it means for two states in a transition system to be bisimilar. [2 marks]

(b) Hennessy–Milner logic has assertions

$$A ::= \bigwedge_{i \in I} A_i \mid \neg A \mid \langle \alpha \rangle A,$$

where $I$ is a set, possibly empty, indexing a collection of assertions $A_i$, and $\alpha$ ranges over a set of actions $Act$. Define the semantics of the logic within a transition system with actions in $Act$. [4 marks]

(c) Show that if two states in the transition system are bisimilar, then they satisfy the same assertions of the logic. [6 marks]

(d) Show that if two states in the transition system satisfy exactly the same assertions of the logic, then they are bisimilar. [8 marks]