CSCI 283 and CSCI 172 - Computer Security - Fall 2008
Quiz 6 Solutions

Figure 1 represents the state diagram of system. An edge from X to Y represents a possible transition, i.e. the system can directly transition from X to Y if there is an edge from X to Y in the state diagram, and not otherwise. (The system can, however, go from X to Y along a path through other states). For (a)-(c)

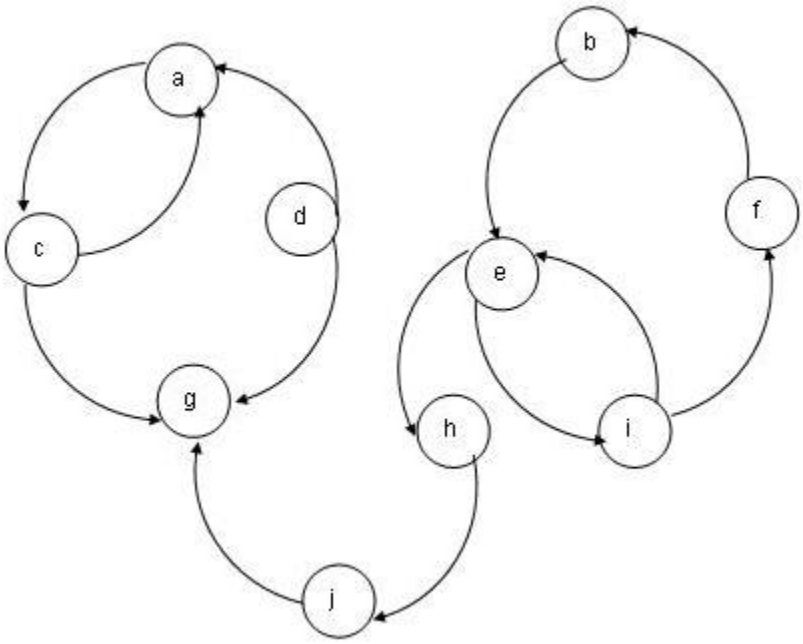

Figure 1:

below, use the following definition of a secure system: one which, when starting from *any* secure state does not enter an insecure one.

a. (1 point) If State a is a secure state, what are the other states that *have to be secure* for the system to be secure? Explain your answer.

Answer: As a is secure, all states reachable from a must also be secure, so c and g must also be secure.

b. (2 points) If State e is an insecure state, what are the other states that *have to be insecure* for the system to be secure? Explain your answer.

Answer: As e is insecure, all states it is reachable from must also be insecure, so i, b and f must also be insecure.

c. (3 points) If State g is an insecure state, can the system of Figure 1 be secure? Explain your answer.

Answer: State g is reachable from every other state in the diagram. This means that, whatever state the system starts in, it can reach State g. Hence every state of the system must be labelled insecure.

You may either answer yes, and indicate that the security requirement is trivially satisfied by labelling all states insecure, or no, indicating that there is no secure system because there are no secure states. The correct answer is yes.

d. (3 points) Consider a security policy that does not allow State e, i.e. considers State e to be insecure. Suppose further that this is all that is required by the security policy – that the system not enter State e. Suppose, in order to enforce the policy, an implementation disallows entry into e, as well as into any of the insecure states in your answer to (b). Is the implementation secure? Is it precise? Explain your answers.

Answer: As the system disallows entry into all states from which State e is reachable, it is secure. However, it is not precise because it disallows entry into states that are not labelled insecure by the policy.

e. (1 point) Consider a security policy that names a as the only secure state. Suppose, in order to enforce the policy, an implementation allows entry into a as well as all of the states in your answer to (a). Is the implementation secure?

Answer: No, the implementation is not secure because it allows entry into states that are not secure by policy.