TUTORIAL SIX

Deadlocks

1. Indicate whether the following statements are true or false. Justify your answers.

   (a) In the five philosopher dining problem, if we allow at most four philosophers to be hungry simultaneously, deadlock may still occur.

   (b) It is impossible to have a deadlock involving only one single process.

   (c) If a resource allocation graph contains a cycle, then a deadlock occurs.

2. Use resource-allocation graphs to model the following situations, determine if deadlock occurs in each case. There are three resource types, R, S, and T, each with a single instance.

Case 1	Case 2
P1 requests R	P1 requests R
P2 requests T	P2 requests T
P1 requests S	P1 requests S
P2 requests S	P2 requests S
P1 releases R	P1 requests T
P1 releases S	

3. A resource-allocation state is given below:

	Allocation	Max	Need
USER 1	1	6	5
USER 2	1	5	4
USER 3	2	4	2
USER 4	4	7	3

   Available = 2

   (a) If USER 4 asks for one more unit, does this lead to a safe state or an unsafe one?

   (b) Is USER 3 asks for one more unit, does this lead to a safe state or an unsafe state?

4. The status of a system involving four processes and four resource types at a specific time is as follows:

	Allocation				Request			
	R1	R2	R3	R4	R1	R2	R3	R4
P1	1	0	0	0	0	1	0	0
P2	0	0	0	1	0	1	1	0
P3	1	0	0	0	0	1	0	0
P4	0	0	1	0	0	0	0	1

   At this moment in time, only two units of resource R2 are available. Use a deadlock detection algorithm to determine if the system is in a deadlock state.