TUTORIAL SIX

Deadlocks

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

(a) In the dining-philosopher problem with five philosophers, if we allow at most four of them 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 has occurred.

2. A resource-allocation state is given below. Assume Available = 2.

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

(a) If PROCESS 4 requests for one unit of the resource next, does this lead to a safe state or an unsafe one?

(b) If PROCESS 3 requests for one unit of the resource next, does this lead to a safe state or an unsafe one?

3. Consider the following snapshot of a system's state, with five processes (P0, P1, P2, P3 and P4) and four resource types (A, B, C and D). The current **Allocation**, **Need** and **Available** matrices are as shown in the table below.

		Available A B C D 0 **x** **y** 1
Process	**Allocation**	**Need**
	A B C D	A B C D
P0	2 2 0 0	1 4 0 0
P1	3 1 0 0	0 1 0 0
P2	1 1 0 0	1 0 0 0
P3	0 0 1 1	0 0 1 1
P4	0 0 1 1	0 0 3 2

Suppose process P3 generates the resource request (A=0 B=0 C=0 D=1) next. Compute the minimum values for ***x*** and ***y*** so that this request from P3 can be granted and the resulting system state is safe. Justify your answer and show the algorithm steps for generating the safe sequence.