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Due: 3/19/17

Consider the following snapshot of a system:

	Allocation				Max	Available			
	A	B	C	D	A B C D	A	B	C	D
P0	1	0	1	3	1 5 5 6	0	2	3	1
P1	1	1	0	1	1 2 2 2				
P2	1	1	1	1	2 3 4 4				
P3	1	1	1	2	2 5 4 2				
P4	0	0	1	1	1 0 1 2				

Answer the following questions using the banker's algorithm:

a. Show the content of the matrix *Need* below.

	Need			
	A	B	C	D
P0	0	5	4	3
P1	0	1	2	1
P2	1	2	3	3
P3	1	4	3	0
P4	1	0	0	1

$$P_0: 1013$$

$$+ 3566$$

$$\hline 4579 \checkmark$$

$$P_2: 1111$$

$$+ 1332$$

$$\hline 2443 \checkmark$$

$$P_3: 1112$$

$$+ 2443$$

$$\hline 3555 \checkmark$$

$$P_4: 0011$$

$$+ 3555$$

$$\hline 3566 \checkmark$$

b. Show that the system is in a safe state *by listing the order in which processes can be executed without producing a deadlock.*

$P_1, P_2, P_3, P_4, P_0$

c. If a request from process  $P_0$  arrives for (0, 2, 2, 0), can the request be granted immediately? Show the updated **NEED** and **Allocation** matrices. If yes, show the safe sequence. If no, list the processes that are possibly in a deadlock.

Allocation	Need				Available	
A B C D	A	B	C	D	A B C D	
P <sub>0</sub> 1 2 3 3	P <sub>0</sub>	0	3	2	3	P <sub>0</sub> X
P <sub>1</sub> 1 1 0 1	P <sub>1</sub>	0	1	2	1	P <sub>1</sub> X
P <sub>2</sub> 1 1 1 1	P <sub>2</sub>	1	2	3	3	P <sub>2</sub> X
P <sub>3</sub> 1 1 1 2	P <sub>3</sub>	1	4	3	0	P <sub>3</sub> X
P <sub>4</sub> 0 0 1 1	P <sub>4</sub>	1	0	0	1	P <sub>4</sub> X

All processes are possibly in a deadlock, unable to complete any process with available resources