1. Write a program for the implementation of Banker's Algorithm: A system that uses Banker's algorithm deadlock avoidance has five processes and uses resources of four different types (A, B, C and D). There are multiple resources of each type. Is the state of the system below safe?

Process	**Current Loan**				**Max. Need**				**Available Resources**				**Total Resources**			
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
P0	1	0	2	0	3	2	4	2	3	4	0	1	13	13	9	13
P1	0	3	1	2	3	5	1	2								
P2	2	4	5	1	2	7	7	5								
P3	3	0	0	6	5	5	0	8								
P4	4	2	1	3	6	2	1	4								

2. A system with following processes and resources exits. Write a program for the implementation of Banker's Algorithm to check whether the system is safe state or unsafe state?

Process	**Current Loan**				**Max. Need**				**Available Resources**			
	A	B	C	D	A	B	C	D	A	B	C	D
P0	0	0	1	2	0	0	1	2	1	5	2	0
P1	1	0	0	0	1	7	5	0				
P2	1	3	5	4	2	3	5	6				
P3	0	6	3	2	0	6	5	2				
P4	0	0	1	4	0	6	5	6				

3. Write a program for the implementation of Banker's Algorithm

Customer Name	**Process**	**First Installment (in Lakhs)**	**Cash on Hands (in Lakhs)**	**Max Requirement (in Lakhs)**
John	**P0**	**20**	**15**	**13**
Joe	**P1**	**17**	**14**	
Ram	**P2**	**19**	**12**	