7.1 Consider the traffic deadlock depicted in Figure 7.10.

a. Show that the four necessary conditions for deadlock hold in this example.

b. State a simple rule for avoiding deadlocks in this system.

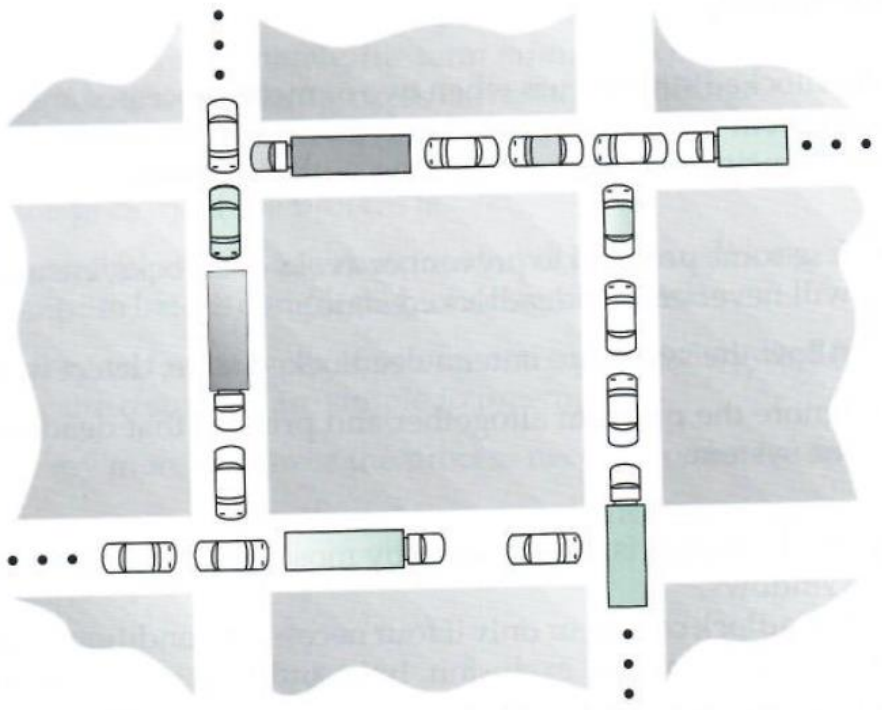

Figure 7.10 Traffic deadlock for Exercise 7.1

7.8 Consider a system consisting of m resources of the same type being shared by n processes. A process can request or release only one resource at a time. Show that the system is deadlock free if the following two conditions hold:

a. The maximum need of each process is between one resource and m resources.

b. The sum of all maximum needs is less than $m + n$.

7.13 Consider the following snapshot of a system:

	Allocation	*Max*	*Available*
	A B C D	*A B C D*	*A B C D*
P_0	2 0 0 1	4 2 1 2	3 3 2 1
P_1	3 1 2 1	5 2 5 2	
P_2	2 1 0 3	2 3 1 6	
P_3	1 3 1 2	1 4 2 4	
P_4	1 4 3 2	3 6 6 5	

Answer the following questions using the banker's algorithm:

a. Illustrate that the system is in a safe state by demonstrating an order in which the processes may complete.

b. If a request from process P_1 arrives for $(1, 1, 0, 0)$, can the request be granted immediately?

c. If a request from process P_4 arrives for $(0, 0, 2, 0)$, can the request be granted immediately?