Chapter 7 Assignments

1. Define the term **deadlock**. Briefly describe the **four conditions** that can cause a deadlock in a system.
2. “Deadlocks can be described more precisely in terms of a directed graph called a **resource allocation graph**”. Based on this description, show resource allocation graphs with and without deadlocks.
3. Consider the following **resource allocation graph** (shown in Figure 1), attempt the **graph reduction** method and determine whether any **deadlock** exists or not (where *R*1, *R*2, and *R*3 are resources and *P*1, *P*2, *P*3, and *P*4 are processes).



Figure 1.

1. Consider the following **resource allocation graph** (shown in Figure 1), attempt the **graph reduction** method and determine whether any **deadlock** exists or not (where *R*1, *R*2, and *R*3 are resources and *P*1, *P*2, *P*3, and *P*4 are processes).



1. Consider the following snapshot of a system (where *P*0, *P*1, *P*2, *P*3, *P*4, *A*, *B*, *C*, and *D* are processes, and resources respectively):

 ***Allocation Max Available Need***

 *A B C D A B C D A B C D*

 *P*0 0 0 1 2 0 0 1 2 1 5 2 0

 *P*1 1 0 0 0 1 7 5 0

 *P*2 1 3 5 4 2 3 5 6

 *P*3 0 6 3 2 0 6 5 2

 *P*4 0 0 1 4 0 6 5 6

Answer the following questions using the **banker’s algorithm**:

5.1. What is the content of the matrix ***Need***?

5.2. Is the system in a *safe state*? If yes, then show the safe state sequence.

5.3. If a request from process *P*1 arrives for (0, 4, 2, 0), can the request be granted

 immediately?

1. Describe various options for breaking a deadloack.