**7.22**

|  |  |  |  |
| --- | --- | --- | --- |
| **Process** | **Allocated (Release)** | **Max** | **Need** |
| P0 | 3 0 1 4 | 5 1 1 7 | 2 1 0 3 |
| P1 | 2 2 1 0 | 3 2 1 1 | 1 0 0 1 |
| P2 | 3 1 2 1 | 3 3 2 1 | 0 2 0 0 |
| P3 | 0 5 1 0 | 4 6 1 2 | 4 1 0 2 |
| P4 | 4 2 1 2 | 6 3 2 5 | 2 1 1 3 |

1. UNSAFE

**Available:** (0 3 0 1)

0 3 0 1 + 3 1 2 1 (P2) = 3 4 2 2

3 4 2 2 + 2 2 1 0 (P1) = 5 6 3 2

5 6 3 2 + 0 5 1 0 (P3) = 5 11 4 2

What would be available for the last resource type does not satisfy the needs of the remaining two processes.

1. SAFE (P1, P2, P3, P4, P0)

**Available:** (1 0 0 2)

1 0 0 2 + 2 2 1 0 (P1) = 3 2 1 2

3 2 1 2 + 3 1 2 1 (P2) = 6 3 3 3

6 3 3 3 + 0 5 1 0 (P3) = 6 8 4 3

. . .

Once P2 makes its request, executes, then completes , it’s possible to have the processes execute in any order past that point, however it’s necessary in this case that the first two must execute and complete as shown.