# COS Questions – Lecture 4

Operating System Concepts (Tenth Edition)

## Deadlocks

**1.1 What are the four conditions necessary for a deadlock to occur?**

**1.2 How does a deadlock present itself in a resource allocation graph?**

**1.3 What are the three strategies for managing deadlocks? How do they differ?**

**1.4 How can a safe state be achieved?**

**1.5 What are the practical problems of recovery from deadlock?**

**1.6 What is the main idea behind the Banker's algorithm?**

**1.7 Given the following snapshot of a system; fill out the matrix $Need$.**

| | Allocation | | | | Max | | | | Need | | | | Available | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **A** | **B** | **C** | **D** | **A** | **B** | **C** | **D** | **A** | **B** | **C** | **D** | **A** | **B** | **C** | **D** |
| **$T_0$** | 0 | 0 | 1 | 2 | 0 | 0 | 1 | 2 | | | | | 1 | 5 | 2 | 0 |
| **$T_1$** | 1 | 0 | 0 | 0 | 1 | 7 | 5 | 0 | | | | | | | | |
| **$T_2$** | 1 | 3 | 5 | 4 | 2 | 3 | 5 | 6 | | | | | | | | |
| **$T_3$** | 0 | 6 | 3 | 2 | 0 | 6 | 5 | 2 | | | | | | | | |
| **$T_4$** | 0 | 0 | 1 | 4 | 0 | 6 | 5 | 6 | | | | | | | | |

**Bonus**: Determine a safe-sequence for the threads in the snapshot.