

50.005 Quiz OS 5 (15 mins)Name: Sample Solutions

Student ID: _____

Note: During the quiz, you can consult written or printed materials. But you can't go online or look at anything electronic, including your laptop, smartphone, etc.

1. Each resource type in a computing system is given a unique integer id. A process can acquire resources incrementally, but when it requests a new resource, the id of the new resource must be strictly higher than the id of any resources already held by the process.

(a) Processes in the system can't become deadlocked. Why not?

Circular waiting can't happen. [2pts]

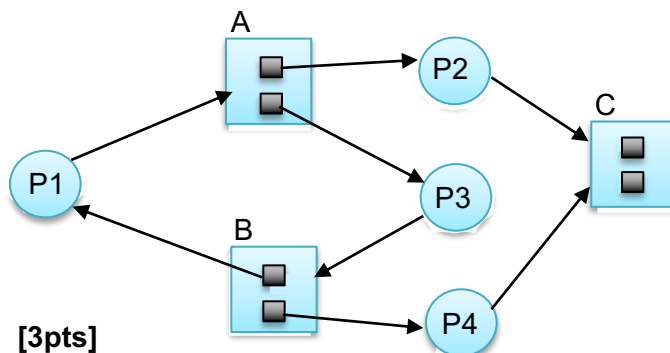
(b) Is the solution approach deadlock avoidance or deadlock prevention? Explain your answer.

Deadlock prevention [1pt]. Because a resource request can be granted as long as it is legal and there are sufficient available resources now. There's no need to check the detailed runtime system state (e.g., current and future allocation patterns) in the decision. [2pts]

2. Consider a system with 4 processes and 3 resource types.

| | Allocation | | | Request | | | Available | | |
|----|------------|---|---|---------|---|---|-----------|---|---|
| | A | B | C | A | B | C | A | B | C |
| P1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 2 |
| P2 | 1 | 0 | 0 | 0 | 0 | 1 | | | |
| P3 | 1 | 0 | 0 | 0 | 1 | 0 | | | |
| P4 | 0 | 1 | 0 | 0 | 0 | 1 | | | |

(a) Draw the resource allocation graph for the above system.



(b) Is the above system deadlocked? If so, say which processes are involved a deadlock. If not, explain why not.

No [1pt]. P2, P4, P3, P1 is a possible termination sequence of the processes [2pts].

Accept alternative termination sequences.

3. Is each of the following statements true or false?

(a) Each process in Unix has its own file descriptor table.

True. [2pts]

(b) A user process in Unix can change the entries of its file descriptor table without using system calls.

False. [2pts]