

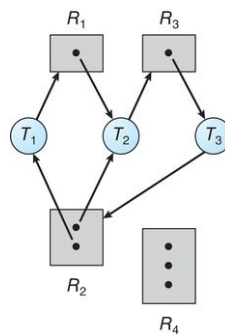
Final Exam Sample Questions

1 Sample Questions

Following are *sample* questions for the final exam. They are not a list of the questions that will be on the exam, nor are they representative of the topics that might be on the exam. They are just to give you an idea of the difficulty and types of questions you will find on the exam. The exam may have True/False, multiple choice, and short answer questions. The questions that ask for numeric answers could be multiple choice or fill in.

1. (60%) **True/False.**

- In a multiprocessor system, mutual exclusion to a section of code can be guaranteed by disabling interrupts before starting the code and enabling them after the code.
- An instruction that executes atomically must consist of a single machine instruction.
- A nonpreemptive kernel is safe from race conditions on kernel data structures.
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- Livelock occurs among a system of threads when a thread continuously attempts an action that fails.
- The resource allocation graph below represents a deadlock state.



2. Given the solution to the weak-reader preference reader-writer problem below

1. `wait(mutex);`
 2. `rc := rc + 1;`
 3. `if rc = 1 then wait(writer);`
 4. `signal(mutex);`
-

```

perform reading
5. wait(mutex);
6. rc := rc - 1;
7. if rc = 0 then signal(writer);
8. signal(mutex);

```

- (a) If we replaced line 5 by the line
`wait (mutex2);`
and we replace line 8 by the line
`signal (mutex2);`

is the code still correct?

3. Given the following snapshot of a resource allocation system in which there are no current outstanding, unsatisfied requests.

	Maximum Claim				Current Allocation			
process	R_1	R_2	R_3	R_4	R_1	R_2	R_3	R_4
P_1	0	0	1	2	0	0	1	2
P_2	2	7	5	0	2	0	0	0
P_3	6	6	5	6	0	0	3	4
P_4	4	3	5	6	2	3	5	4
P_5	0	6	5	2	0	3	3	2

Available			
R_1	R_2	R_3	R_4
2	1	0	0

is the resulting system in a safe or an unsafe state?

- Given a current state of processes and resources represented by an allocation matrix, a maximum claim matrix, and an availability vector, is a given sequence a safe sequence for it?
- Write the definition of the *test-and-set* instruction in software.
- True or False: A nonpreemptive kernel is safe from race conditions on kernel data structures.
- What is a critical section?
- What three conditions must a solution to the critical section problem satisfy?