

**CSI 4337**  
**50 min.**

**Exam #2**  
**CLOSED BOOK**

**Nov. 4, 2002**

Name \_\_\_\_\_

All questions are worth 10 points. Maximum score: 70

1. Suppose you are using a shared variable named **S**, and that **S** currently has the value 10. You are running two independent processes, **P<sub>1</sub>** and **P<sub>2</sub>**, which contain the following two statements.

**P<sub>1</sub>**  
**S = S+7;**

**P<sub>2</sub>**  
**S = S-4;**

These two statements are executed once and only once. After these two processes complete, what are the possible values of **S**? Explain how each possible value could occur.

2. Show how to protect a critical section using the **TestAndSet** instruction, by . Write your code in the boxes given below.

Initializations and declarations:

for (;;)

{

Critical Section

Remainder Section

}

3. There are five conditions that must be true for deadlock to occur. List four of them.

4. Show how to protect the arithmetic statements of problem 1 with one or more semaphores so that only a single result is possible from executing the two processes.

Initializations and declarations:

**P<sub>1</sub>:**

**S = S+7;**

**P<sub>2</sub>:**

**S = S-4;**

5. Given the following allocation tables, is the system in a safe state? If we grant a request of (1,0,1) from P4, will the system be in a safe state? If the states are safe, show the safe sequence. Otherwise show where building the safe sequence fails.

	Has			Max			Free		
	A	B	C	A	B	C	A	B	C
P0	1	1	0	3	2	1	2	0	1
P1	0	0	0	5	1	3			
P2	1	0	1	2	0	2			
P3	0	2	1	3	2	1			
P4	1	0	0	2	3	3			

6. Suppose we have created a decimal computer with page size 100. Our process has 6 pages, and is allocated 6 page frames. The page table is shown below. Translate the list of virtual addresses given below. If an address is illegal, write “error” for the virtual address.

0	21
1	75
2	3
3	12
4	1
5	19

Real	Virtual
10	
150	
327	
455	
1024	
361	
599	
222	
12	
767	

7. Contest winner: What is the primary motivation for the invention of virtual memory?