

Name _____

All questions are worth 10 points. Maximum score: 100

1. What is deadlock prevention? Mention the five conditions and what can be done about them in your answer.

2. The Gemware Docking Company has three programs that usually run together and share data. They deadlock occasionally, and your job is to fix the problem. You examine the code, and the following is what you find. How do you fix the problem?

Program 1	Program 2	Program 3
Red.Wait(); Green. Wait();	Green. Wait(): Blue. Wait():	Blue.Wait(); Red.Wait();
Critical Section	Critical Section	Critical Section
Green.Signal(); Red. Signal();	Blue.Signal(); Green.Signal();	Red.Signal(); Blue.Signal();

3. Given the following allocation tables, is the system in a safe state? If the state is safe, show the safe sequence. Otherwise show where building the safe sequence fails.

	Has		
	A	B	C
P0	1	1	1
P1	0	0	0
P2	3	3	0
P3	1	0	1
P4	1		1

	Max		
	A	B	C
	2	2	2
	1	0	1
			3
	3	2	2
	0	2	0

Free		
A	B	C
0	2	0

4. Is the following system deadlocked? If not show the “safe sequence” otherwise, list the processes that are deadlocked.

	Has		
	A	B	C
P0	1	1	1
P1	2	1	2
P2	1	0	1
P3	1	0	0
P4	0	1	1

	Req		
	A	B	C
P0	0	0	2
P1	0	1	0
P2	3	0	0
P3	0	2	0
P4	1	0	4

Free		
A	B	C
0	0	0

5. We have created a decimal machine with four-digit addresses. The first two digits are the page number, while the second two are the offset. Translate the following addresses, using the given table. If a particular virtual address cannot be translated, write “page fault” for the virtual address.

Page Table

22xx
34xx
11xx
14xx
42xx
12xx
13xx
14xx
21xx
23xx
97xx

Virtual	Real
0114	
1029	
1237	
1066	
0303	
0444	
0911	
0842	
0707	
1111	

6. Determine the number of page faults that will occur with the following reference string using the algorithms OPT, FIFO, and LRU. Simulate each algorithm for three page frames.

1 2 3 2 1 4 1 2 3 4 1 2 3

7. Translate the following real addresses into virtual addresses using the following hierarchical page table. Addresses are specified in decimal, with four digits per address. The first digit indexes the first-level table while the second indexes the second-level table. If an address can't be translated, write "Page Fault" in the real address box.

First-Level Table.	Secondary table addresses (and contents)			
	4000	3124	9798	4488
4000	19xx	17xx	00xx	92xx
3124	16xx	04xx	22xx	08xx
9798	14xx	01xx	23xx	
4488	13xx		24xx	
			21xx	

Virtual	Real
2122	
0341	
3362	
4194	
3144	
2460	
2144	
1211	
0301	
2011	

8. What is Belady's Anomaly?

9. What are the four conditions for a stack algorithm.

10. What does LRU stand for?