CS 4760	**Operating Systems**	**Test 2**
Name:	Spring 2020	Max Pts: 68

Important: This is an open book test. You can use any books, notes, or paper. If there is a syntax error in any program segment, just write it down and you will get full credit for the problem.

1. [6 pt] Describe different components of a process image in Linux.
2. [6 pt] Why does Linux limit the maximum PID to 32767 in standard configuration? How can you increase it?
3. [6 pt] Linux always schedules the processes in the highest priority queue. How does it make sure that the lower priority processes are not starved?
4. [6 pt] How does Linux avoid deadlocks in kernel?
5. [10 pt] Assume a system with four resource types, $C = \langle 8, 5, 12, 10 \rangle$ (this is the total number of resources in the system, and not what is currently available), and the maximum claim table shown below.

Process	R_0	R_1	R_2	R_3
p_0	4	1	2	4
p_1	2	0	1	2
p_2	1	3	0	3
p_3	1	1	1	2
p_4	2	2	3	3

   The resource allocator is considering allocating resources according to the following table:

Process	R_0	R_1	R_2	R_3
p_0	1	0	2	2
p_1	0	0	1	0
p_2	1	2	0	2
p_3	0	2	1	2
p_4	2	2	2	1

   Run the safety algorithm on this system to determine if this state is safe. If it is safe, give the sequence in which processes can be run. If it is unsafe, enumerate the processes that may get involved in a deadlock. Show your steps from the algorithm.
6. [6 pt] What is minimum cost recovery from a deadlock? Illustrate with an example.
7. [6 pt] What type of hardware support do you need to implement relocation at execution time?
8. [10pt] A machine has a memory of 64 frames, with each frame being 1K bytes. Current free-frame list is: 0x27, 0x08, 0x1E, 0x26, 0x00, 0x16, 0x06, 0x07, 0x33, 0x34, 0x02, 0x31, 0x3C, 0x2C, and 0x24. You just scheduled a process that requires 10 frames. Show the resulting page table. Show the translation of logical address 0x0018 and 0x1D87 into physical addresses using your page table. Express your result in hexadecimal. Indicate seg fault, if any.