CS 4760	**Operating Systems**	Test 3
Name:	Fall 2012	Max Pts: 47

Important: This is an open book test. You can use any books, notes, or paper but no electronic device. *Do not log into the computer during the test, or use any electronic or communications device. Switch off your cell phones*. Any device with an ON-OFF switch should have its switch in the OFF position. Any calculations and rough work can be done on the back side of the test pages. If there is a syntax error in any program segment, just write it down and you will get full credit for the problem. You will lose five points for not writing your name.

1. [6 pt] During copy-on-write as a result of `fork(2)`, the kernel just assigns the parent's page frames to the child's address space. Does it allocate *any* memory exclusively to the child at all? If yes, explain what is the memory used for.

2. [10 pt] Consider a machine with an architecture that requires at least 10 frames to be present in memory for an instruction to be executed. Each frame holds 1 MB. The machine has a memory of 64 MB. The OS has allocated 10 MB memory for itself. There are four processes on the system with memory requirement of 20 MB, 33 MB, 10 MB, and 14 MB. Show the memory allocated to these processes using equal allocation and proportional allocation methods.

3. [6 pt] Why do not Unix/Linux allow cross-device hard links for files?

4. [10 pt] Consider a machine with disk blocks of 2048 bytes. You have a new disk of size 1.5TiB. What is the theoretical maximum file size possible using the UFS scheme of file allocation?

5. [6 pt] What is cache snooping? Should I be concerned about it on a uniprocessor single core CPU system? Explain your answer.

6. [9 pt] Ignoring overhead for directories and file descriptors, consider a file system in which files are stored in blocks of 16 KB. For each of the following file sizes, calculate the percentage of wasted file space due to incomplete filling of the last block: 41,600 bytes, 640,000 bytes, 4,064,000 bytes.