CS 4760	**Operating Systems**	Test 1
Name:	Fall 2012	Max Pts: 40

Important: This is an open book test. You can use any books, notes, or paper, but not exchange anything with other students. You are not allowed to use any electronic/communication devices, including a calculator and e-books. *Do not log into the computer during the test. 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. You will lose five points for not writing your name.

1. [10 pt] A computer has a cache, main memory, and a disk used for virtual memory. If a referenced word is in the cache, 20ns are required to access it. If it is in main memory but not in the cache, 60ns are needed to load it into the cache (this includes the time to originally check the cache), and then the reference is started again. If the word is not in main memory, 12ms are required to fetch it from disk, followed by 60ns to copy it to the cache, and then the reference is started again. The cache hit ratio is 0.9 and the main memory hit ratio is 0.6. What is the average time in ns required to access a referenced word on this system?

2. [6 pt] What is the difference between multithreading and multitasking?

3. [6 pt] Explain how the behavior of one of more CPUs is characterized by the interleaving of traces of different processes.

4. [6 pt] A system call executes an instruction that changes the mode of an operating system from user mode to kernel mode. What stops me from writing a program on hoare that will execute the instruction to switch the mode from user to kernel and gain access to lower-level hardware.

5. [6 pt] What is the number of processes created by the following loop:

```
for ( int i ( 0 ); i < 5; i++ )
    pid_t pid = fork();
```

6. [6 pt] We allowed two processes to choose the same `number` in bakery algorithm. How does the situation get resolved if two processes actually get the same `number`?