CS 4760	**Operating Systems**	Test 1
Name:	Fall 2010	Max Pts: 42

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. *Do not log into the computer during the test. Switch off your cell phones.* 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. [8 pt] Explain the difference between multiprogramming, multitasking, multiprocessing, time sharing, and concurrent processing.

2. [6 pt] What is the purpose of system calls? How do the system calls relate to the OS and to the concept of dual mode (kernel mode and user mode) operation?

3. [6 pt] What is an interleaved instruction trace? Compare it to the sequential instruction trace.

4. [6 pt] What is the difference between busy-wait and block-wakeup protocols? Under what circumstances you will prefer to use busy-wait? What about block-wakeup?

5. [6 pt] Explain the difference in the `wait()` operation in semaphore and condition variables.

6. [10 pt] Consider the following version of bakery algorithm:

```
extern int     number[n];                        // In shared memory

void process ( int i )     // i is process id
{
    while ( 1 )
    {
        number[i] = 1 + max ( number, n );   // Add 1 to current max number
        for ( int j ( 0 ); j < n; j++ )
            while ( ( number[j] && ( number[j], j ) < ( number[i], i ) ) );

        critical_section();

        number[i] = 0;

        remainder_section();
    }
}
```

Does this version satisfy our protocol for the critical section problem? Explain your answer.