CS 4760	**Operating Systems**	Test 1
Name:	Spring 2008	Max Pts: 46

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. [6 pt] When discussing the structure of Unix, we say that the shell is at the same level as an application. On the surface, shell seems like just another program that takes a string of data from the user, interprets that string and executes the command. Yet the shell is treated as a special application. What makes the shell so special?

2. [6 pt] Explain the difference between cluster computing and grid computing.

3. [6 pt] Explain the difference between programmed I/O and interrupt-driven I/O. Which out of the two can be used for multiprogramming? Why cannot the other be used for multiprogramming?

4. [6 pt] What is process switching? What is mode switching? Which of the two require intervention by the kernel?

5. [10 pt] Look at the following solution to critical section problem for two processes. Is it a valid solution?

```
extern bool flag[2];              // Shared flag
extern int  turn;                 // Shared variable

void process ( const int i )
{
    while ( 1 )
    {
        turn = 1 - i;
        flag[i] = true;
        while ( turn != i && flag[1-i] )

        critical_section();

        flag[i] = false;

        remainder_section();
    }
}
```

6. [6 pt] What is the distinction between blocking and nonblocking with respect to messages?

7. [6 pt] Show that the bakery algorithm adequately solves the critical section problem.