CS 376	**Operating Systems**	Test 1
Name:	Winter 2002	Max Pts: 50

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. *Do not log into the computer during the test.* 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] What is SIMD? Give at least two examples of SIMD architectures in modern microprocessors.

2. [4 pt] What are the advantages of using cluster computing? Can you name some applications that benefit from the same?

3. [5 pt] What is the difference between a program and a process? Can you change a program without changing its process? How?

4. [5 pt] In Unix, we have two modes of execution: user mode and kernel mode. Both the modes execute at the same priority. Then, what is gained by executing part of the code in kernel mode?

5. [8 pt] What is the maximum number of processes in the system at any time using the following code segment:

```
extern char mypath[];
for ( int i ( 0 ); i < 10; i++ )
{
    pid_t pid, pid_out;
    unsigned char status;
    if ( pid = fork() )
        pid_out = wait ( &status );
    else
        execl ( mypath, "child", "parameter", NULL );
}
```

Assume that `child` performs some simple computation and returns the result, that is captured in `status`.

6. [6 pt] What are *daemons* and *zombies* in Unix? Can we perform some meaningful task through zombies? Explain your answer.

7. [8 pt] We went over the `test-and-set` instruction to solve the critical section problem with hardware support. However, in some machines, the `test-and-set` instruction is not available, but an equivalent is touted to be a `swap` instruction that atomically swaps the contents of two memory locations. Can you use `swap` to solve the critical section problem? How?