CS 376	**Operating Systems**	Test 1
Name:		Maximum Points: 46

Important: This is an open book test. You can use any books, notes, or paper. *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.

1. (a) [2 pt] How can I print a list of every file and its size in my area in the Unix filesystem?

   (b) [4 pt] I am using `/bin/csh` as my default shell. I want to make sure that I somehow keep track of the entire path to my current working directory in the prompt. How can I achieve this during my current session? How can I achieve this in every session whenever I log in?

   (c) [4 pt] At home, I use Linux and run `/bin/csh` as my default shell. A program that I use frequently to dial into internet through the campus goes by the name `dip`. Can you create an alias called `dipkill` that will kill the process `dip`?

2. [10 pt] A DMA module is transferring characters to main memory from an external device transmitting at 9600 bps. The processor can fetch instructions at the rate of 1 million instructions (bytes) per second. By how much will the processor be slowed down due to the DMA activity?

3. [12 pt] Suppose that we have a multiprogrammed computer in which each job has identical characteristics. In one computation period, T, for a job, half the time is spent in I/O and the other half in processor activity. Each job runs for a total of N periods. Define the following quantities:

   (a) Turn around time = actual time to complete a job

   (b) Throughput = average number of jobs completed per time period T

   (c) Processor utilization = percentage of time that the processor is active (not waiting)

   Compute these quantities for one, two, and four simultaneous jobs, assuming that the period T is distributed in each of the following ways:

   (a) I/O first half, processor second half

   (b) I/O first and fourth quarters, processor second and third quarters

4. [4 pt] Why is busy waiting less efficient than the blocking wait?

5. [10 pt] Consider the following concurrent program (written using the C syntax):

```
main()
{
    int x, y, z,
        a = 1, b = 2, c = 3, d = 4;
    parbegin
        {
            x = a + b;
            y = c * d;
            z = x / y;
        }
        {
            x = a + c;
            y = b * d;
            z = y / x;
        }
    parend
    printf ( "x = %d\ny = %d\nz = %d\n", x, y, z );
}
```

The blocks within the curly braces are to be considered as one compound statement for the purpose of the `parbegin/parend` statements, that is, there are only two blocks being executed in parallel. Moreover, each statement can be assumed to be indivisible.

Show all the possible values that can be printed by the `printf` statement.