Open book and notes. For partial credit, show all of your work clearly in the space provided or on the additional page at the end of the exam. If the additional page is used, be sure to clearly label the content for each problem. Be sure to *read each problem carefully*. You should answer all 6 questions. Note that the exam is double sided.

1. (12 points) Correct the following code segment so that it displays the product of the integers in the inclusive interval 5 through 15.

```
int Factor = 5;
int Product = 0;
do {
  ++Factor;
  Product *= Factor;
} until (Factor == 15);
cout << Product << endl;
```

2. (12 points) Briefly, and in your own words, describe what happens when a parameter is passed to a function by value.

3. (12 points) Briefly, and in your own words, describe what happens when a parameter is passed to a function by reference.

4. (20 points) Write a function that will prompt the user to enter the name of a data file containing floating point numbers, open the data file, and return the fifth number in the data file. Due to time constraints, it is not necessary to include comments in your code.

5. (20 points) What is the output of the following program? Be sure to indicate your reasoning.

```
#include <iostream>
#include <string>

using namespace std;

void f(int i, int j);

int main()
{
  int a = 10;
  int b = 20;
  f(a, b);
  f(b, a);
  cout << "main: a= " << a << endl;
  cout << "main: b= " << b << endl;
  return 0;
}

void f(int i, int j)
{
  int temp;
  temp = i;
  i = j;
  j = temp;
  cout << "f: i = " << i << endl;
  cout << "f: j = " << j << endl;
}
```

6. (24 points) Once upon a time there were three computer engineers traveling across the country. They ran out of money in Washington and hitch hiked to Bill Gates' mansion. They thought that they might be able to work on some of the high-tech gadgetry there. Melinda (Bill's wife) felt sorry for them and told them that she could find 300 hours worth of work that they could do over the next several weeks. She also told them that they were free to divide up the work in the best way they saw fit. The CE's agreed to start work the next day. In the morning, one of the engineers suggested that there was no reason for them to all do the same amount of work. Instead, he suggested that the following scheme would make it more interesting:

> The engineers would all draw cards. Each card was marked with a number. The number indicated both the number of days and the number of hours on that day that the drawer must work. For example, if an engineer drew a card with a five on it, the engineer would be required to work five hours a day for five days.

Write a program that displays all possible ways to divide up the work according to the above scheme. Due to time constraints, it is not necessary to include comments in your code. [Hint: This is an adaptation of the Lazy Hobo Riddle written by the *New York Times*'s crossword puzzle editor.]

Additional work area for any problem. Clearly identify to which problem the work on this page is related.