

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. Due to time constraints, it is not necessary to include comments in your code.

1. (10 points) Find the errors in the following code segment and explain how to correct them.

```
2 // Function prototype
// The function should return the square of the value passed to it
double square(double& number);
4
// Function implementation
6 // The function should return the square of the value passed to it
double square(double number);
8 {
double number;
10 return number * number;
}
```

2. (10 points) Briefly, and in your own words, describe what the `srand()` function in the `cstdlib` library is for and give an example of how it could be used (one C++ statement).

3. (10 points) What does the following program do? Be sure to explain your reasoning.

```
#include <iostream>
2 using std::cout;
  using std::cin;
4 using std::endl;

6 int mystery(int i, int j);

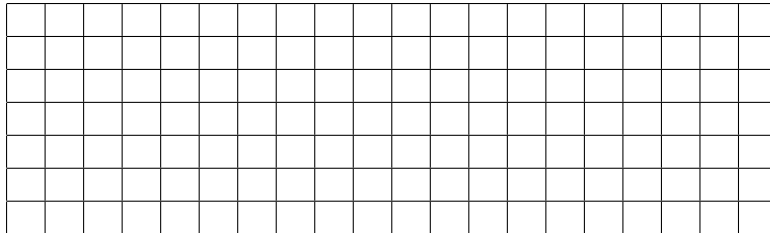
8 int main()
  {
10   int a = 10;
     int b = 20;
12   cout << "Enter two integers: ";
     cin >> a >> b;
14   cout << "The result is " << mystery(a, b) << endl;
     return 0;
16  }

18 int mystery(int i, int j)
  {
20   int retVal;
     if(j==1) {
22     retVal = i;
       ++j;
24   } else {
       retVal = j;
26   }
     retVal += j;
28   return retVal + i;
  }
```

4. (15 points) In the grid provide show what will be displayed by the following program. For partial credit, be sure to *show your work*.

```
#include <iostream>
2
int e2(int x, int& y);
4
int main()
6 {
  int inc=3, dec=5;
8  for(unsigned int i=0; i<3; ++i) {
    int j = 2;
10    std::cout << j << i << ':' << e2(inc, dec) << std::endl;
  }
12  std::cout << i << "\n" << inc << "\n" << dec << std::endl;
  return 0;
14 }

16 int e2(int x, int& y)
  {
18   std::cout << ++x << '-' << y-- << '\n';
   return x * y;
20 }
```





5. (20 points) Write a function that will accept an integer, and two doubles and will display the numbers in a specified format.

If the function is called three times:

```
tabulate(1, 3.4, 2.7832);  
2 tabulate(15, 17.2222, 12.83);  
tabulate(3, 0.1, 0.0);  
4 std::cout << "123456789012345678901234567890";
```

The following should be produced:

```
1          3.4          2.78  
15         17.2         12.83  
3          0.1          0.00  
123456789012345678901234567890
```



6. An integer number is said to be a **perfect number** if the sum of its factors, including 1 (but not the number itself), is equal to the number. For example, 6 is a perfect number because $6 = 1 + 2 + 3$. A function should be written that will indicate whether or not a number given to it is a perfect number.

(a) (5 points) Give the most appropriate function prototype for the function.

(b) (20 points) Implement the function.



(c) (10 points) Write a program that will ask the user to enter a filename and then save a list of all of the perfect numbers between 2 and 50 in the file.



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



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