1 Basic Concepts—20 points

Circle the correct answer. Each problem in this section is worth 2 points. If you are using a pen and need to change your answer, write true or false to the right of the question.

2 Program Analysis—20 points

Problem 1. There are numerous errors in the program below. Circle only ten and describe why it is an error. There is at most one error per line. Each error is worth two points.

```cpp
/* test2.cpp */
#include <ostream.h>
#include <iomanip.h>
#include <stdlib.h>
int isPrime( long n );

int main()
{
    int nPrimes = 0
    ofstream oFile;
oFile.open( primes.out, 'ios::out' );
oFile << "Primes:\n";

    /* count primes */
    for( long i = 2 : i <= 1000000 : i += 1 )
    {
        if( isPrime(i) )
            nPrimes =+ 1;
    }

    oFile << '\t' << setw(7) << nPrimes << endl;

    return 0;
}
```
int IsPrime( long n )
{
    int i == 2;
    while( i < n/2 )
        if( n % i == 0 )
            return 0;
        i++;}
    return 1;
}

3 Program Output Analysis—24 points

Fill in the blank. Each problem in this section is worth 4 points.

Problems 12–14 refer to the following code fragment. x and y are integer variables.

if( x >= 5 && y <= 2 )
    cout << x - y;
else if( x <= 1 && y >= 2 )
    cout << x * y;
else
    cout << y / x;

Problem 2. What is the output if x = 2 and y = 3?
Problem 3. What is the output if x = 5 and y = 2?
Problem 4. What is the output if x = 1 and y = 3?

Problems 15 and 16 refer to the following program.

int main()
{
    int i, j = 3;
    for( i = 1 ; i < 10 ; i += 3 ) {
        j = func( i, j );
    }
}

int func( int j, int i )
{
    if( i*3-j%3 <= 5 )
        cout << "B I: " << i++ << " " << j++ << endl;
    else
        cout << "B II: " << ++i << " " << j << endl;

    return ++j;
}

Problem 5. 
Problem 6. 
Problem 7. 

4 Functions—20 points

For all problems in this section, show all additional variable names and types that you choose to use. Use meaningful function names!

Problem 8 (5 points). Write a function that will print a table of the floor function \( \text{floor}(x)\), for \( x = 0.0 \) to 10.0 in increments of 0.1. Output is to be written to an output file stream.

Problem 9 (7 points). Write a function to test if a character is a valid starting character for an integer variable for the Fortran language. Integer variables must start with the letters i..n. Both lower and upper case letters are valid. There is no I/O in the function.

Problem 10 (8 points). Write a function that will find and return the minimum, maximum, and average of four real numbers. There is no I/O in the function.

5 Program—16 points

Show and use meaningful names (function and variables) that you use when writing this program.

Problem 11. Write a complete program that counts the number of student absences. The attendance data is stored in a text file, one student record per line (see sample below). Missing dates start with a / and excused absences end with a *. Your program must include a function to calculate the number of absences.

Hints: Recall that the end of line character is '\n'. The number of absences is the number of missing dates minus the number of excused absences.

```
Jeff Smith /17* /24
Andy Martin /17
Joe Pyle /29
Mary Rosen /17* /27* /29
Carl Zimmer /24* /27
October November
```
Design: (6 points)

Program: (10 points)

Bonus Problem: Two points.