Name: _____

Write all of your responses on these exam pages. If you need extra space please use the backs of the pages.

1 Short Answer: 3 Points Each

1. Write the line of code that will create a constant named PI and store in it 3.1459.

2. Write s line of code that will set the console output to display exactly two decimal places for all floating point data types, as you would in displaying currency.

3. Write C++ expressions for the following algebraic expression, $t = \dfrac{x^2 + h}{r^3 - y}$.

4. What is the value of !!7 ?

5. What is "fall through"? In what structure can it occur and what causes it?

6. The `if` statement regards an expression with a nonzero value as _____.

7. ASCII stands for what? What is it used for and what has it been replaced by?

8. Describe the difference between pretest loops and posttest loops. For each of the three types of loops we have discussed list their pretest/posttest types.

9. What header file do you need to include in a program that performs file operations?

10. Which loop should you use in situations where you wish the loop to repeat until the test expression is false, and the loop should not execute if the test expression is false to begin with?

2 Program Traces: 15 Points Each

1. Write the output of the following program.

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

using namespace std;

int main() {
    int x, y, z;

    cout << "Input: ";
    cin >> x >> y >> z;

    if (x > y) {
        cout << "One" << endl;
        if (z < x && 3 * x > y)
            cout << "Two" << endl;
        else
            cout << "Three" << endl;
    } else {
        cout << "Four" << endl;
        if (z < x || z > y)
            cout << "Five" << endl;
        else
            cout << "Six" << endl;
    }
    cout << "-----" << endl;

    x = 4; y = 3; z = 7;
    x = z++ * --y;
    cout << x << " " << y <<
       " " << z << endl;

    string str1 = "Exam 1 is too easy."
        ;
    string str2 = "to";
    string str3 = "eat";

    cout << str1.length() << endl;
    cout << str1.at(10) << endl;
    cout << str1[7] << endl;

    cout << "-----" << endl;

    int pos = str1.find(str2);
    cout << pos << endl;
    cout << str1.substr(pos, 7) <<endl;
    cout << str1.substr(3, pos) <<endl;

    cout << "-----" << endl;
    pos = str1.find_first_of(str3);
    cout << pos << endl;
    pos = str1.find_last_of(str3);
    cout << pos << endl;

    return 0;
}
```

Output

```
Input: 5 9 15
```

2. Write the output of the following program.

```cpp
#include <iostream>

using namespace std;

int main() {
    int x, y, z;

    cout << "Input: ";
    cin >> x >> y >> z;

    for (int i = x; i <= y; i++) {
        cout << i << " ";
        if (i > z) {
            cout << z;
            z -= 2;
        }
        cout << endl;
    }

    cout << "-----" << endl;
    cout << x << " " << y << " " << z
        << endl;
    cout << "-----" << endl;

    while (x > z) {
        cout << x << " " << z << endl;
        x--;
        z++;
    }

    cout << "-----" << endl;
    cout << x << " " << y << " " << z
        << endl;
    cout << "-----" << endl;

    do {
        cout << y << " " << z << endl;
        if (y > z)
            y--;
        else
            y++;
    } while (y != z);

    return 0;
}
```

Output

Input: 3 9 6

3   Programming: 20 Points Each

1. Write a complete C++ program with a loop that lets the user enter a series of integers. The user should enter -99 to signal the end of the series. After all the numbers have been entered, the program should display the largest and smallest numbers entered. A program run is below.

```
Enter Number (-99 to quit): 2
Enter Number (-99 to quit): 6
Enter Number (-99 to quit): 4
Enter Number (-99 to quit): 9
Enter Number (-99 to quit): 5
Enter Number (-99 to quit): -99
Largest = 9
Smallest = 2
```

2. Write a complete C++ program that will continually roll a die until a given run length of the same roll happens. The user will input the run length, 1 or greater. Error check the input and reask for input if needed. The program should then simulate rolling the 6-sided die until the same roll comes up the desired number of times consecutively. For example, say the user wants a run of 4. If the simulation is,

```
2 5 4 3 6 4 4 2 1 1 1 3 2 4 5 4 4 4 2 5 3 3 3 3
```

Then the simulation would stop and the count would be 24. The main should set the seed of the random number generator to the time of the system clock. Three runs are below.

```
Input a run length (>= 1): 5
The number of rolls to get 5 consecutive equal rolls was 3482.

Input a run length (>= 1): 10
The number of rolls to get 10 consecutive equal rolls was 18083797.

Input a run length (>= 1): 7
The number of rolls to get 7 consecutive equal rolls was 17787.
```