

Name _____

Intro CS I Midterm Exam

1. **(18 points)** Given the following variable declarations and assignments, what do the following C++ statements evaluate to? If the answer is an integer, indicate so by writing your answer as an integer (without a decimal point). If your answer is a floating-point number, indicate so by writing the decimal point – for example, if the answer is 2 but it's a type double, then write 2.0

```
int i = 30;  
int j = 6;  
double x = 15.0;  
double y = -5.0;
```

_____ j % i _____ i % j _____ x / j

_____ x / i _____ i / y _____ i / j

_____ j / i _____ 1 / i * y _____ y * 5 / j

2. **(4 points)** Mark the following statements as true or false.
- a. _____ A while is guaranteed to execute at least one time.
 - b. _____ The for loop is best when you have a fixed number of iterations
 - c. _____ A valid condition is any expression which can evaluate to true or false.
 - d. _____ Goto statements make code more readable.

3. **(8 points)** What does a compiler do?

4. **(10 points)** Declare variables for each of the following, being sure to select proper data types and names.
- a. A constant indicating the ratio of a circle's circumference to its diameter (3.1415).
 - b. The number of people in a room.
 - c. A letter.
 - d. Whether or not someone is a college student.
 - e. The distance between two points on a plane.
5. **(10 points)** For each of the variables in question 4, write a statement which assigns some value being sure to use the correct type of literal. (You can skip the constant as you can't assign values to a constant!)
6. **(10 points)** When Carl Friedrich Gauss was a schoolboy, his teacher once decided to punish a particularly rowdy class by having them sum the whole numbers from 1 to 100. Gauss worked out the correct answer in a matter of minutes by finding a closed form formula for the sum. His teacher, not to let the young Gauss out so easily, then modified the problem to sum the first 1000 whole numbers. Of course, much to the teacher's chagrin, Gauss's formula was general and immediately yielded the correct answer. To make it harder the teacher said "Fine, sum all the whole numbers divisible by either 3 or 7 over the range from 1 to 10,000." Gauss couldn't work out a closed-form answer to this problem, and so he wrote a C++ program to solve the problem. Your task is to write a code segment containing the loop which will come up with the correct sum. (Don't write the whole program, just the loop and variables.)

7. **(15 points)** Suppose we want the user to enter a number between 1 and 5 (inclusive). Write a C++ code segment which will ask the user for the number. If there response is too low, print the message "too low". If there response is too high, print the message "too high". In either case, force the user to try again. That is, keep repeating the process until they give a valid response.

8. **(5 points)** Write a **SINGLE C++ STATEMENT** which will compute the following formula:

$$-b + \sqrt{\frac{b^2 - 4ac}{2a}}$$

9. **(20 points)** Write a complete C++ program which does the following. In the interest of time, you can leave out the comments, but everything else should be there.

Write a program which plays rock paper scissors with the user. The computer should select one of the three choices at random. (This can be accomplished using `rand() % 3 + 1` which will return a random number between 1 and three inclusive. When the program runs, it should allow the user to select rock paper or scissors and should display an appropriate message indicating the winner. For example consider the following session:

```
Pick One:
```

```
1.) Rock
```

```
2.) Paper
```

```
3.) Scissors
```

```
Choice? 1
```

```
I chose scissors.
```

```
Rock crushes scissors. You win!
```