CS 115 Midterm 1 SOLUTIONS, Spring 2009

Rules

- You may use one handwritten 8.5 x 11" cheat sheet (front and back). This is the only resource you may consult during this exam.
- You must show your work/explain your answers in order to receive partial credit for incorrect answers.
- All snippets of code can be assumed to be enclosed within `int main()`. You can assume that the `iostream`, `fstream`, `iomanip`, `string`, and `cmath` libraries have been included at the beginning of the program.
- When you are asked to write *a snippet* of code, you may also assume that it is enclosed within `int main()` and that any necessary libraries have been included.
- When you are asked to write *a complete program*, you must write the `#include` statements, the `int main()`, etc. in your solution to receive full credit.
- A line consisting solely of "..." represents one or more unspecified C++ statements, some of which may change the values of program variables.

Problem 1: 24 points.

What does each of the following snippets of code print to the screen?

(a)
```
string w = "world";
cout << "Hello ";
cout << w << endl;
```

Hello world

(b)
```
int a = 2;
cout << a++ << endl;
cout << a << endl;
```

2
3

(c)
```
float a = 5 / 2;
cout << a << endl;
```

2

(d)
```
bool b = true;
cout << (b && b) << endl;
```

1

(e)
```
int i = 2;
do {
     cout << "cat" << endl;
     i--;
} while (i);
```

cat
cat

(f)
```
for (float f = 1; f <= 1.61; f += 0.2) {
     cout << f << endl;
}
```

1
1.2
1.4
1.6

Problem 2: 16 points.

State whether each segment of code is valid C++. If it is not valid C++, fix it so that it will compile. (Valid C++ means that it will compile without errors.)

(a)
```
int a;
cin >> a;
if (cin.fail == 1) {
     cout << "You messed up!" << endl;
}
```

Invalid – should be
if (cin.fail() == 1)

(b)
```
float f = 4.5;
int i = 0;
double q = f + i;
```

Valid

(c)
```
for (int i=5; i >= 0; i--) {
     for (int j=0; j < 200; j++) {
          cout << i << "," << j << endl;
     }
}
```

Valid

(d)
```
int i = 25;
int j = 100;
cout << sqrt(i,j);
```

Invalid – should be
cout << sqrt(i) << "," << sqrt(j);

Problem 3: 30 points.

Write short snippets of code to accomplish the following tasks:

(a) *Assume:*
- An integer variable `N` has already been declared and defined.
- Its current value is greater than 0.

Your task:
- Print all the **odd** numbers between 1 and `N`, inclusive.
- Each number should be printed on a separate line.

```
for (int i=1; i <= N; i += 2) {
        cout << i << endl;
}
```

(b) In an infinite loop:
- Ask the user to type their name.
- Greet them by printing "Hello, " followed by the name they typed.
- Each greeting should be printed on a separate line.

```
string name;
while (true) {
      cout << "Type your name." << endl;
      cin >> name;
      cout << "Hello, " << name << endl;
}
```

(c) *Assume:* Float variables `price` and `budget` have been declared and defined.

Your task:
- If `price` is greater than `budget`, print `Sorry!`
- Otherwise, print `Yay!`

```
if (price > budget) {
      cout << "Sorry!" << endl;
}
else {
      cout << "Yay!" << endl;
}
```

(d) *Assume*: Integer variables `a`, `b`, and `c` have already been declared and defined.
Your task: Print the value of the smallest of these three variables.
Fine print: If two or more of the three variables are tied for the smallest value, you should only print the value once.

```
if ( (a <= b) and (a <= c) ) {
        cout << a << endl;
}
else if (b <= c) {
        cout << b << endl;
}
else {
        cout << c << endl;
}
```

Problem 4: 30 points.

For this problem, you must write a **complete program** that does the following:

- Asks the user to enter an integer
  Note: You can assume that the user's input is valid.
- If the number is less than 1, prints `Goodbye` and exits the program using `return 0;`
- Using a loop, computes the sum of the integers between 1 and the user's number, inclusive
- If the computed sum is equal to N * (N+1) / 2 (where N is the user's number):
  - Prints `The shortcut works!`
  - Prints the computed sum
- Otherwise, prints `Oops!` and does not print the sum

Solution on next page.

```
#include <iostream>
using namespace std;

int main( ) {
    int userInput, sum=0;

    cout << "Enter an integer: ";
    cin >> userInput;

    if (userInput < 1) {
        cout << "Goodbye!" << endl;
        return 0;
    }

    for (int i=0; i <= userInput; i++) {
        sum += i;
    }

    if (sum == userInput * (userInput+1) / 2) {
        cout << "The shortcut works!" << endl;
        cout << sum << endl;
    }
    else {
        cout << "Oops!" << endl;
    }
    return 0;
}
```