CS 31 Worksheet 1

This worksheet is entirely **optional**, and meant for extra practice. Some problems will be more challenging than others and are designed to have you apply your knowledge beyond the examples presented in lecture, discussion or projects. All exams will be done on paper, so it is in your best interest to practice these problems by hand and not rely on a compiler.
Solutions are written in red. The solutions for **programming** problems are not absolute, it is okay if your code looks different; this is just one way to solve the specific problem.

Concepts

If Statements, Cin, Variables, Doubles, Ints

Reading Problems

1. Circle where the bug occurs and explain what incorrect behavior will happen. What do you think this program will output? Add a fix.

```
cout << "Enter your name: ";
getline( cin , name );

cout << "\nEnter your UID: ";
int UID;
cin >> UID ;

cout << "\nEnter your Major: ";
getline( cin , major );

cout << "\nEnter your residence hall: ";
getline( cin , hall );
```

Bug: It will skip "Enter your Major", because getline has already consumed a newline character.

A newline is always appended to your input when you select Enter or Return when submitting from a terminal. It is also used in files for moving toward the next line. When the flow of control reaches std::getline(), the newline will be discarded, but the input will cease immediately. The reason this happens is because the default functionality of this function dictates that it should (it attempts to read a line and stops when it finds a newline).

Because this leading newline inhibits the expected functionality of your program, it follows that it must be skipped our ignored somehow. One option is to call cin.ignore(10000, '\n') after the the first extraction. It will discard the next available character so that the newline is no longer intrusive.

2.

a)

```
cin >> a >> b >> c
    >> x >> y >> z;
```

Input:

```
1   2   3
4 5.5 6.6
```

Result:

```
a = 1  b = 2  c = 3
x = 4  y = 5.5  z = 6.6
```

b)

```
cin >> a >> b >> c;
cin >> x >> y >> z;
```

Input:

```
1
2
3
4

5.5
6.6
```

Result:

```
a = 1  b = 2  c = 3
x = 4  y = 5.5  z = 6.6
```

c)

```
cin >> a >> x;
cin >> b >> y;
cin >> c >> z;
```

Input:

```
1 2.2
3 4.4
5 6.6
```

Result:

```
a = 1  b = 3  c = 5
x = 2.2  y = 4.4  z = 6.6
```

d)

```
cin >> a
    >> b >> c
    >> x >> y
    >> z;
```

Input:

```
1   2   3
4 5.5 6.6
```

Result:

```
a = 1   b = 2   c = 3
x = 4   y = 5.5   z = 6.6
```

3. For each of the following assignment statements, show the value that will be stored in the variable on the left hand side. Assume that you are given the following declarations:

```
int num;
double val;
```

1.	`num = 17 / 2 + 4;`	12
2.	`val = 17 / 2 + 4;`	12.0
3.	`num = 17 / 2.0 + 4;`	12
4.	`val = 17 / 2.0 + 4;`	12.5
5.	`num = 11 % 6 / 2 - 1;`	1
6.	`val = 11 % 6 / 2.0 - 1;`	1.5
7.	`num = 3 - (5 + 10 / (2 * 2));`	-4
8.	`val = 3 - (5 + 10 / (2 * 3.0));`	-3.667
9.	`val = 4.5 * (5 - 3);` `num = val;`	9.0 9
10.	`num = 15 / 2 % 3 - 1;`	0
11.	`num = 7 * 2 - 5 / 3;` `val = num;`	13 13.0

4. If x = -2, y = 5, z = 0 , and t = -4, what is the value of each of the following logical expressions?

a) `x + y < z + 1` — `false`

b) `x - 2 * y + y < z * 2 / 3` — `true`

c) `3 * y / 4 < 8 && y >= 4` — `true`

d) `t > 5 || z < 2` — `true`

e) `x * y < 10 || y * z < 10` — `true`

5. Write syntactically correct logical expressions for the following conditions:

a) m is less than 100 — `m < 100`

b) n is positive and greater than m — `n > 0 && n > m`

c) m is between 5 and 10 (inclusive) — `m >= 5 && m <= 10`

d) k is less than 1 or greater than 2 — `k < 1 || k > 2`

e) j and k are both negative — `j < 0 && k < 0`

f) i is an even number — `i % 2 == 0`

6. What is the output of each of the following statements? Assume that

x = 5, y = 2, z = 10, and temp = 0

```
a) if (y >= x)
     y = z;
     cout << x << "  " << y << "  " << z << endl;
```

`5  2  10`

```
b) if (y >= x)
   {
     y = z;
     cout << x << "  " << y << "  " << z << endl;
```

```
   }
```

NOTHING IS PRINTED

```
c) if (z < y)
     temp = x;
     x = z;
     z = temp;
    cout << x << "  " << y << "  " << z << endl;
```

10 2 0

```
d) if (z > y)
   {
     temp = x;
     x = z;
     z = temp;
   }
   cout << x << "  " << y << "  " << z << endl;
```

10 2 5

```
e) if (x >= 6)
    cout << x + y << endl;
    cout << x + y << endl;
```

7

Programming Problems

1. Write a program that takes in three numbers to average and outputs the average of these numbers? Please assume three numbers will always be entered.

Sample output:
Number: 4.0
Number: 2.0
Number: 8.0
The average is 4.66667!

```
#include <iostream>

using namespace std;

int main() {
```

```
 double num;
 double total = 0;

 // for the first number
cout << “Number: “;
cin >> num;
total += num;
 // for the second number
cout << “Number: “;
cin >> num;
total += num;
 // for the third number
cout << “Number: “;
cin >> num;
total += num;

cout << "The average is “ << total/3 << “!” << endl;
```

2. Write a program that takes in exactly four numbers and outputs the sum of the even numbers.

Sample output:
Enter a number: 2
Enter a number: 9
Enter a number: -3
Enter a number: 6
Result: 8

```
#include <iostream>

using namespace std;

int main() {
   int input_num = 0;
   int total = 0;
  // for the first number
  cout << "Enter a number: ";
  cin >> input_num;
  if (input_num % 2 == 0) {
          total += input_num;
  }
  // for the second number
  cout << "Enter a number: ";
  cin >> input_num;
```

```
  if (input_num % 2 == 0) {
        total += input_num;
  }
  // for the third number
  cout << "Enter a number: ";
  cin >> input_num;
  if (input_num % 2 == 0) {
        total += input_num;
  }
  // for the fourth number
  cout << "Enter a number: ";
  cin >> input_num;
  if (input_num % 2 == 0) {
        total += input_num;
  }


  cout << "Result: " << total << endl;
}
```

3. Write a program that takes in two numbers and a command (Add, Subtract, Multiply, Divide) and then performs that calculation.

Sample output:
Enter your first number: 3
Enter your second number: 7
Enter your command: Multiply
Result: 21

```
int main() {
   int first = 0;
   int second = 0;
   string command = "";
   cout << "Enter your first number: ";
   cin >> first;
   cout << "Enter your second number: ";
   cin >> second;
   cin.ignore(10000, '\n');

   cout << "Enter your command: ";
   getline(cin, command);
   if (command == "Add")
        cout << "Result: " << first + second << endl;
   else if (command == "Subtract")
```

```
        cout << "Result: " << first - second << endl;
    else if (command == "Multiply")
        cout << "Result: " << first * second << endl;
    else if (command == "Divide" && second != 0)
        cout << "Result: " << first / second << endl;
    else {
        cout << "Invalid command!" << endl;
    }

}
```

4. Write a program that takes in a number as an int and outputs the sum of the all of the digits in that number. Please assume only three digits numbers will be entered

Sample Output:
Enter a three digit number: 184
The sum of the digits in your number is 13!

```
#include <iostream>

using namespace std;

int main() {
    cout << "Enter a number ";
    int num;
    cin >> num;

    int sum = 0;
    int total = 0;

    // for the first digit
    sum += num % 10;
    num = num / 10;

    // for the second digit
    sum += num % 10;
    num = num / 10;

    // for the third digit
    sum += num % 10;
    num = num / 10;


    cout << "The sum of the digits in your number is " << sum << "!" << endl;
```