CS 31 Worksheet Week 2

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.

Concepts

If Statements, Cin, Variables, Doubles, Ints

Reading Problems

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

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

int main()
{
      cout << "Enter your name: ";
      string name;
      getline( cin , name );

      cout << "Enter your UID: ";
      int UID;
      cin >> UID;

      cout << "Enter your major: ";
      string major;
      getline( cin , major );

      cout << "Enter your residence hall: ";
      string hall;
      getline( cin , hall );

      cout << "\n" << UID << " is the ID of " << name << ", a "
           << major << " student who lives in " << hall << endl;
}
```

2. What is the output produced by the following code?

```
int a = 340;
int b = 22;
if (a % 10 == 0) {
  a /= 10;
  cout << a << endl;
  if ((a + b) % 2 == 0) {
    b--;
    cout << b << endl;
  }
}
```

3. This code snippet is supposed to read an integer and tell you whether it is even or odd. Find the 3 bugs contained in the code and fix them.

```
int n;
cin >> n;
string evenOrOdd = "";
if (n%2 = 0) {
      evenOrOdd = even;
} else {
      evenOrOdd = odd;
}
cout << "The number is " << evenOrOdd << endl;
```

Programming Problems

1. You are driving too fast and a police officer stops you. Write a program that prints the size of your ticket depending on your speed: `no ticket`, `small ticket`, or `big ticket`. If your speed is no more than 60, write `no ticket`; if it is over 60 and no more than 80, write `small ticket`; if it is over 80, write `big ticket`. There's an exception if it's your birthday: if your answer is `yes`, the limits are 5 higher in all cases. Here's a sample dialog:

```
What was your speed? 82
Is it your birthday? yes
small ticket
```

2. Write a program that reads a string of length one and writes the integer that the string represents as a Roman numeral (I is 1, V is 5, X is 10, L is 50, C is 100, D is 500, M is 1000; the letter may be upper or lower case). If the string is not a valid Roman numeral of length one, write `Invalid input`. Sample:

```
Enter Roman numeral letter: V
Its value is 5
```

3. Write a program that reads two numbers and a command: `add`, `subtract`, `multiply`, or `divide`. If the input is valid, write the result of the operation; otherwise, write an appropriate error message. Sample dialog:

```
Enter the first number: 3
Enter the second number: 7
Enter the command: multiply
Result: 21
```

4. Write a program that reads three numbers and writes their mean.

```
Number: 6
Number: 2
Number: 5
The mean is 4.3333
```

5. Write a program that reads three numbers and writes their median.

```
Number: 6
Number: 2
Number: 5
The median is 5
```

6. Write a program that determines whether or not a year is a leap year in the Gregorian calendar. A year is a leap year if it is divisible by 4, unless it is divisible by 100 and not by 400. (Ignore the fact that this definition is not correct for years before the Gregorian calendar was adopted.)

```
Year: 2004
2004 is a leap year
```