CECS 282 - Homework 10

Complete these problems on a separate sheet of paper. Due April 21.

1. Reading from *C++ How to Program*:

   (a) Chapter 11.1, 11.2

   (b) *Skim* Chapter 11.3, 11.4

   (c) Chapter 12.3, 12.3.1, 12.3.2, 12.3.3

   (d) Chapter 12.3.4 (don't read "Virtual Destructors")

2. The following table shows some methods of Java's `String` class. For each entry in the table, provide **a single equivalent statement** for C++'s `string` class. (You may need to research some of these.) Remember that Java strings are **immutable**, unlike C++ strings. Assume there exists a string variable named `s`. Again, each answer must be a **single statement.**

Operation	Java method
Retrieve a character at index 3	`char c = s.charAt(3);`
Extract a substring from index 2 to 5, inclusive	`String substr = s.substring(2, 6);`
Get the length of the string	`int len = s.length();`
Find the index of the first occurrence of ':'	`int ndx = s.indexOf(':');`
Reverse a string	`s = new StringBuffer(s).reverse();`
Replace all instances of '.' with '+'	`s = s.replaceAll('.', '+');`

3. Given the following three classes:

```
class A {
   void F() { }
};
class B : public A {
   void G() { }
;
class C : public A {
   void H() { }
};
```

Which of the following code fragments **will not compile**?

   (a) ```
A *a = new A();
a->F();
```

   (b) ```
A *b = new B();
b->F();
```

   (c) ```
A *c = new C();
c->F();
```

   (d) ```
A *d = new B();
d->G();
```

   (e) ```
B *e = new B();
e->G();
```

   (f) ```
C *f = new B();
f->H();
```

   (g) ```
B *g = new B();
C *h = (C *)g;
h->H();
```

4. Suppose you need to add a virtual function called `Something()` to a class you wrote. Where do you need to put the `virtual` keyword? Indicate all that apply.

   (a) In the .h file when declaring the function.

   (b) In the .cpp file when defining the function.

   (c) In any code that calls the function.

5. Read about the C++ standard library classes `std::ifstream` and `std::ofstream`. Answer the following questions:

   (a) What library header must you `#include` to use these classes?

   (b) Suppose you have a text file called `numbers.txt`, and that file contains an unknown number of integers, separated by spaces, on a single line of text. Write a short `main` function that uses an `ifstream` object to open the `numbers.txt` file, and calculates the **mean** of the numbers in the file.

   (c) Write a short `main` that declares a `Rational` object with the value $\frac{1}{3}$, and then writes that object to a text file called `output.txt`. Use the `osteam& operator<<(ostream &lhs, const Rational &rhs)` you wrote for outputting a `Rational` object to an output stream.