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西交利物浦大學

Department of Electrical and Electronic Engineering

EEE102 C++ Programming and Software Engineering

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**Assignment2 Class and Objects<sup>1</sup>**  
**SDP Report**

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I certify that I have read and understood the University's *Policy for dealing with Plagiarism, Collusion and the Fabrication of Data* With reference to this policy, I certify that:

- My work does not contain any instances of plagiarism and/or collusion.
- My work does not contain any fabricated data.

**By handing in my assignment for marking, I formally declare that all the above information is true to the best of my knowledge and belief.**

**Signature:** Zheng Sun

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<sup>1</sup>Last updated on March 19, 2017

### **1. Problem Statement:**

The assignment aims to test the basic concepts about Classes and Objects and to reinforce the understanding of OOP. Overall, the object of the assignment is clear and lucid.

**a)** Two classes are there to be designed to hold two different types of data(attributes) – the Fraction type and the Complex type.

**b)** Methods of the two classes will need to be designed to satisfy the behaviours of the class.

### **2. Analysis:**

#### **a) Inputs:**

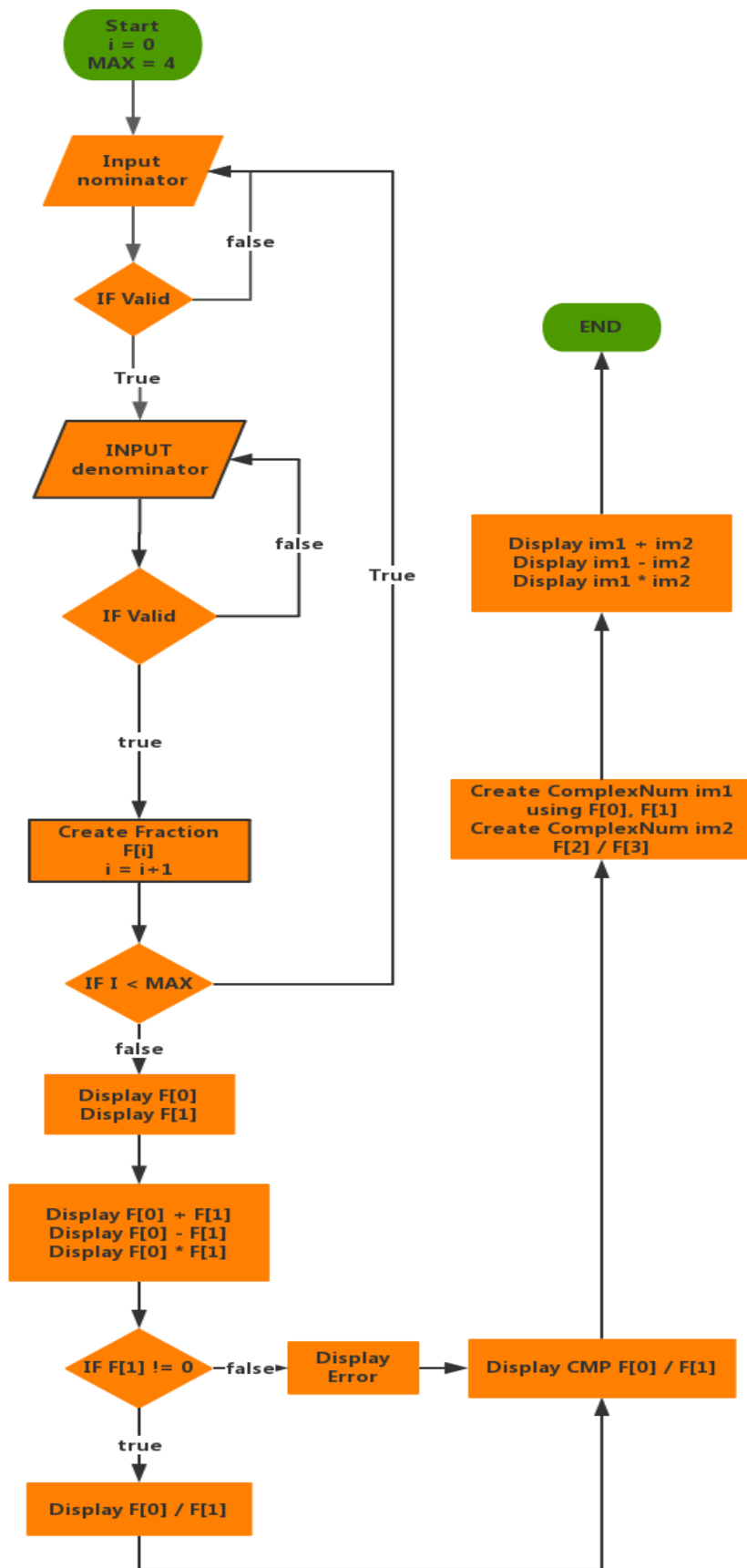
Accept 8 int type numbers in total, as to convert them to 4 Fraction Type samples (each occupies 2 inputs as nominators and denominators) or 2 ComplexNum type samples (each need 2 Fraction type to construct the real part and imaginary part).

#### **b) Output:**

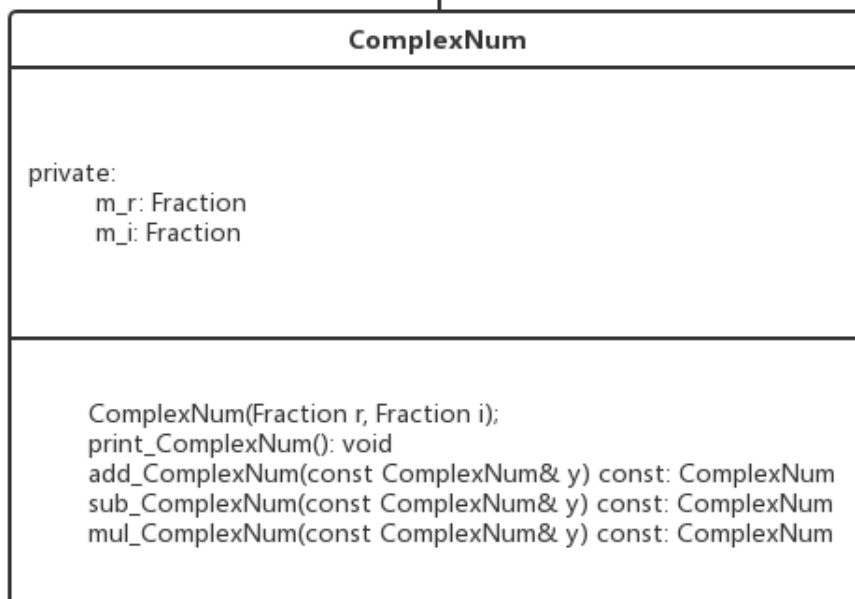
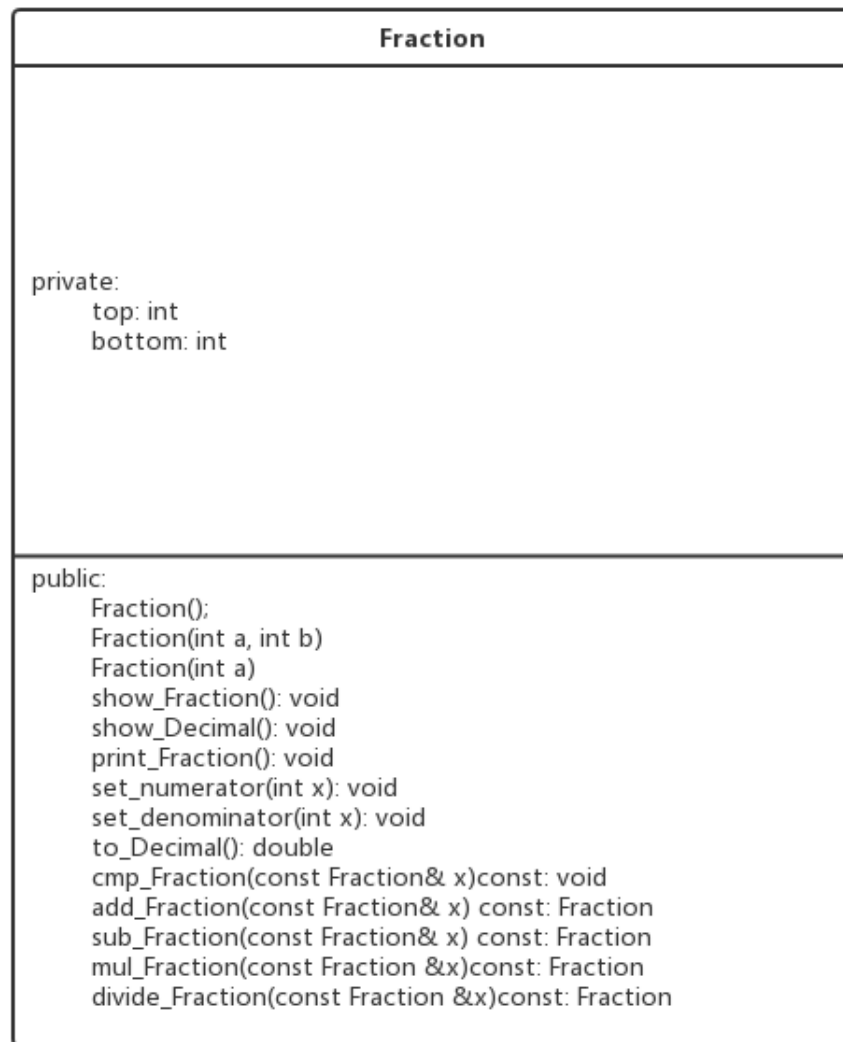
The demonstration of the behaviours of the class Fraction and ComplexNum as required by the client, such as addition, subtraction, multiplication, etc.

### **3. Design**

#### **a) main() function design**



b) Class Design: class Fraction will be the base class for ComplexNum



#### 4. Implementation:

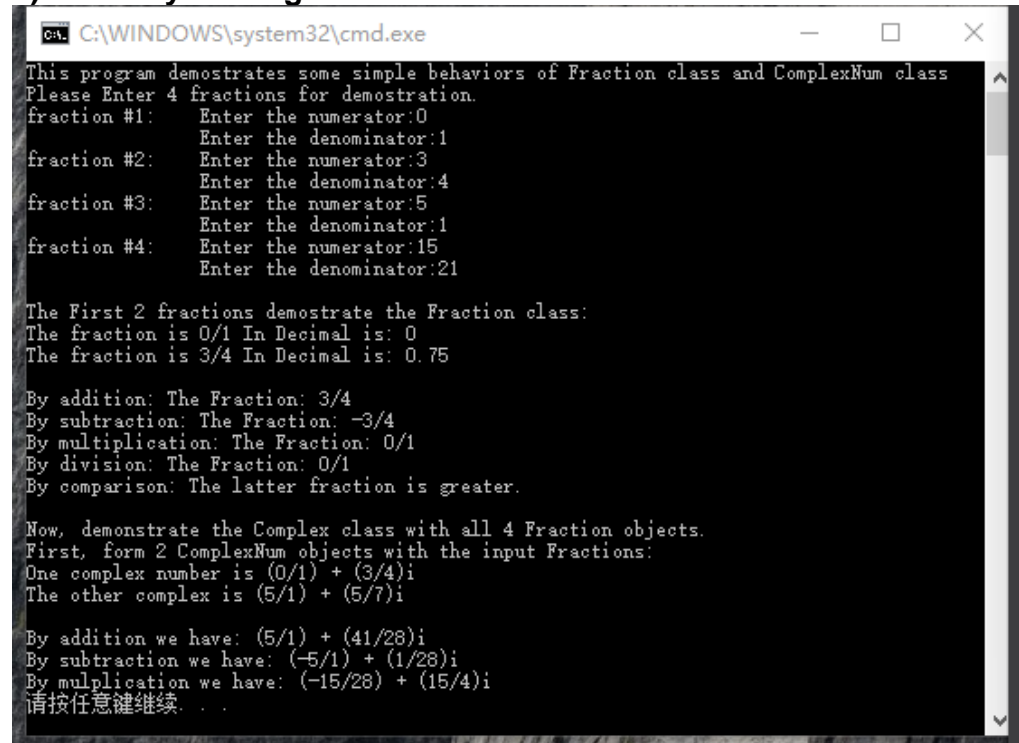
EEE102\_Assgnmet\_2\_Zheng.Sun15\_1507820\ClassDec.h

EEE102\_Assgnmet\_2\_Zheng.Sun15\_1507820\MemberFunctions.cpp

EEE102\_Assgnmet\_2\_Zheng.Sun15\_1507820\Source.cpp

#### 5. Testing

##### a) Ordinary Testing



```
C:\WINDOWS\system32\cmd.exe
This program demonstrates some simple behaviors of Fraction class and ComplexNum class
Please Enter 4 fractions for demonstration.
fraction #1: Enter the numerator:0
              Enter the denominator:1
fraction #2: Enter the numerator:3
              Enter the denominator:4
fraction #3: Enter the numerator:5
              Enter the denominator:1
fraction #4: Enter the numerator:15
              Enter the denominator:21

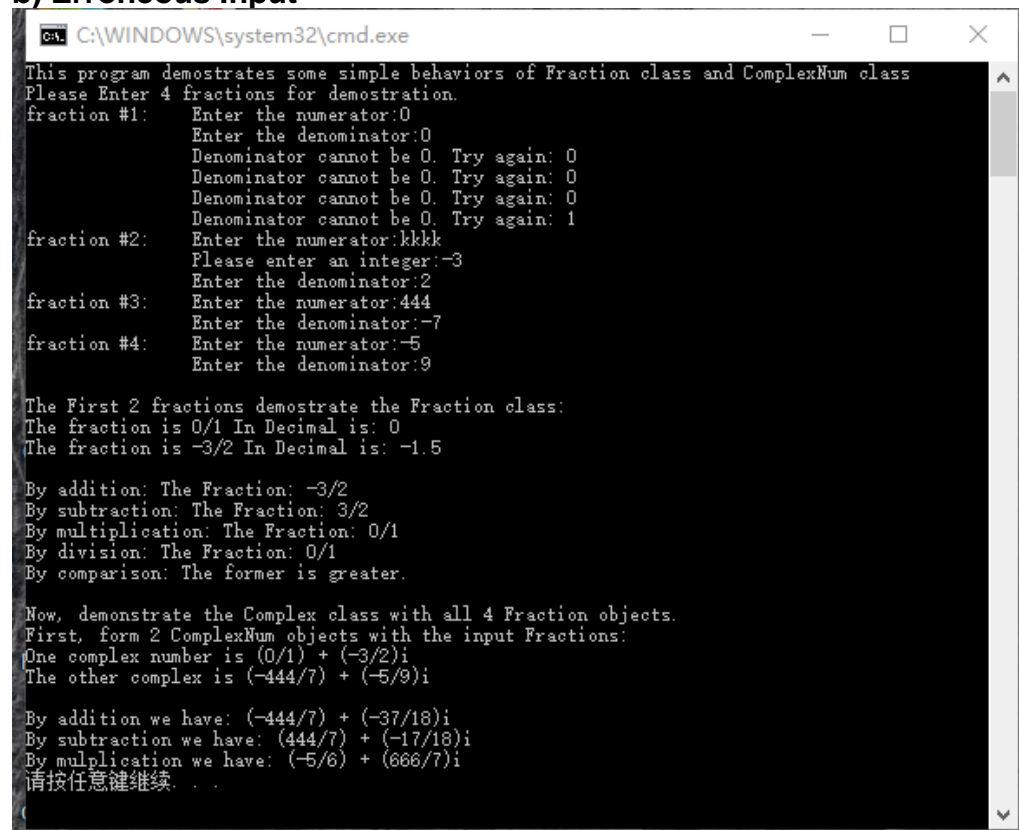
The First 2 fractions demonstrate the Fraction class:
The fraction is 0/1 In Decimal is: 0
The fraction is 3/4 In Decimal is: 0.75

By addition: The Fraction: 3/4
By subtraction: The Fraction: -3/4
By multiplication: The Fraction: 0/1
By division: The Fraction: 0/1
By comparison: The latter fraction is greater.

Now, demonstrate the Complex class with all 4 Fraction objects.
First, form 2 ComplexNum objects with the input Fractions:
One complex number is (0/1) + (3/4)i
The other complex is (5/1) + (5/7)i

By addition we have: (5/1) + (41/28)i
By subtraction we have: (-5/1) + (1/28)i
By multiplication we have: (-15/28) + (15/4)i
请按任意键继续. . .
```

##### b) Erroneous Input



```
C:\WINDOWS\system32\cmd.exe
This program demonstrates some simple behaviors of Fraction class and ComplexNum class
Please Enter 4 fractions for demonstration.
fraction #1: Enter the numerator:0
              Enter the denominator:0
              Denominator cannot be 0. Try again: 0
              Denominator cannot be 0. Try again: 0
              Denominator cannot be 0. Try again: 0
              Denominator cannot be 0. Try again: 1
fraction #2: Enter the numerator:kkkk
              Please enter an integer:-3
              Enter the denominator:2
fraction #3: Enter the numerator:444
              Enter the denominator:-7
fraction #4: Enter the numerator:-5
              Enter the denominator:9

The First 2 fractions demonstrate the Fraction class:
The fraction is 0/1 In Decimal is: 0
The fraction is -3/2 In Decimal is: -1.5

By addition: The Fraction: -3/2
By subtraction: The Fraction: 3/2
By multiplication: The Fraction: 0/1
By division: The Fraction: 0/1
By comparison: The former is greater.

Now, demonstrate the Complex class with all 4 Fraction objects.
First, form 2 ComplexNum objects with the input Fractions:
One complex number is (0/1) + (-3/2)i
The other complex is (-444/7) + (-5/9)i

By addition we have: (-444/7) + (-37/18)i
By subtraction we have: (444/7) + (-17/18)i
By multiplication we have: (-5/6) + (666/7)i
请按任意键继续. . .
```