Homework 3

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Exercise 1

Draw the UML diagram and implement the class QuadraticEquation ($ax2 + bx + c = 0$). The class should contain:

- A field for each coefficient a, b, c
- A constructor that takes the 3 coefficients
- A method getDiscriminant that computes the discriminant b2 - 4ac
- A method hasRealSolution that checks if the discriminant is positive
- A method isQuadratic that checks if a is different from zero
- A method hasDuplicatedSolution that checks if the discriminant is zero
- Two methods getSolution1 and getSolution2 that returns the two solutions (if any) solution1 = (-b+sqrt(discriminant))/(2a) solution2 = (-b-sqrt(discriminant))/(2a)

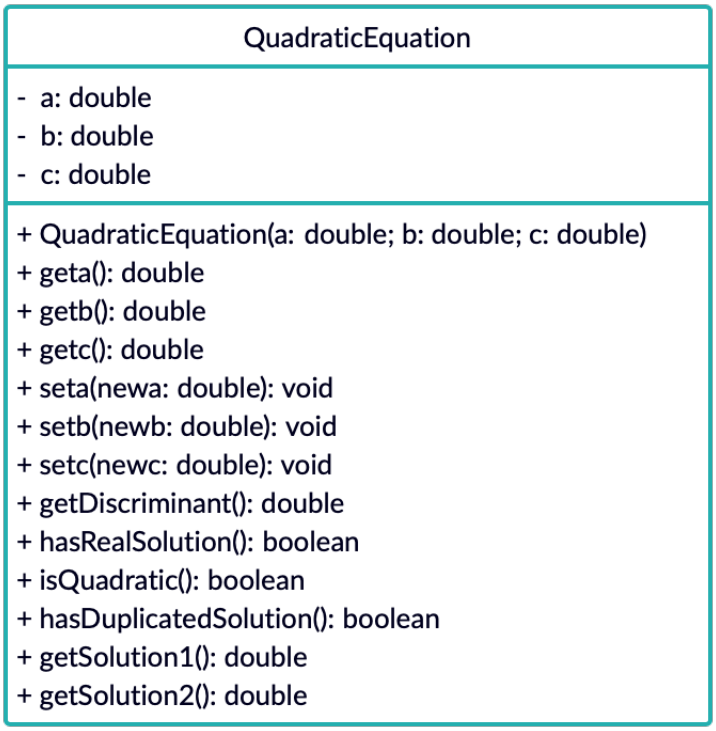

Figure 1: QuadraticEquation

Here is the output of my main:

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```
baoyechen@BaoyedeMacBook-Air BaoyeChen_hw3_submission % java QuadraticEquation
noSolution: f(x) = 1.0x^2 + 1.0x + 2.0
Is noSolution quadratic? true
Does noSolution have real solution? false
Does noSolution have duplicate solution? false
Discriminant = -7.0
The solution to this equation is: x1 = NaN
The solution to this equation is: x2 = NaN

oneSolution: f(x) = 1.0x^2 + 2.0x + 1.0
Is oneSolution quadratic? true
Does oneSolution have real solution? true
Does oneSolution have duplicate solution? true
Discriminant = 0.0
The solution to this equation is: x1 = -1.0
The solution to this equation is: x2 = -1.0

twoSolution: f(x) = 1.0x^2 + 2.0x + -8.0
Is twoSolution quadratic? true
Does twoSolution have real solution? true
Does twoSolution have duplicate solution? false
Discriminant = 36.0
The solution to this equation is: x1 = 2.0
The solution to this equation is: x2 = -4.0

notQuadratic: f(x) = 0.0x^2 + 1.0x + 2.0
Is notQuadratic quadratic? false
Does notQuadratic have real solution? true
Does notQuadratic have duplicate solution? false
baoyechen@BaoyedeMacBook-Air BaoyeChen_hw3_submission %
```

QuadraticEquation Output.txt

Exercise 2

Implement the code that follows this UML diagram. Add methods to add/remove students from courses and to assign professors to courses.

Source code is submitted separately.

Here is the output of my main:

12

```
baoyechen@BaoyedeMacBook-Air BaoyeChen_hw3_submission % java Course
-------------------------------
Professor name: John
The Professor is teaching 3 classes:
cs101
cs102
cs103
-------------------------------

-------------------------------
Professor name: Jane
The Professor is teaching 1 classes:
cs104
-------------------------------

*****************************
Courese Title: cs101
Instructor: John
Class size: 58
The student list:
Student 1
Student 2
Student 3
Student 4
Student 5
Student 6
Student 7
Student 8
Student 9
Student 10
Student 11
Student 12
Student 13
Student 14
Student 15
Student 16
Student 17
Student 18
Student 19
Student 20
Student 21
Student 22
Student 23
Student 24
Student 25
Student 26
```

```
Student 27
Student 28
Student 29
Student 30
Student 31
Student 32
Student 33
Student 34
Student 35
Student 36
Student 37
Student 38
Student 39
Student 40
Student 41
Student 42
Student 43
Student 44
Student 45
Student 46
Student 47
Student 48
Student 49
Student 50
Student 51
Student 52
Student 53
Student 54
Student 55
Student 56
Student 57
Student 58
*****************************

*****************************
Courese Title: cs102
Instructor: John
Class size: 6
The student list:
Student 1
Student 2
Student 3
Student 4
Student 5
Student 6
*****************************

*****************************
Courese Title: cs103
Instructor: John
Class size: 6
The student list:
Student 1
Student 2
```

```
Student 3
Student 4
Student 5
Student 6
*****************************

*****************************
Courese Title: cs104
Instructor: Jane
Class size: 6
The student list:
Student 1
Student 2
Student 3
Student 4
Student 5
Student 6
*****************************

Try to add two students to cs101
add1 is added to cs101
add2 is added to cs101
New course information:
*****************************
Courese Title: cs101
Instructor: John
Class size: 60
The student list:
Student 1
Student 2
Student 3
Student 4
Student 5
Student 6
Student 7
Student 8
Student 9
Student 10
Student 11
Student 12
Student 13
Student 14
Student 15
Student 16
Student 17
Student 18
Student 19
Student 20
Student 21
Student 22
Student 23
Student 24
Student 25
Student 26
```

```
Student 27
Student 28
Student 29
Student 30
Student 31
Student 32
Student 33
Student 34
Student 35
Student 36
Student 37
Student 38
Student 39
Student 40
Student 41
Student 42
Student 43
Student 44
Student 45
Student 46
Student 47
Student 48
Student 49
Student 50
Student 51
Student 52
Student 53
Student 54
Student 55
Student 56
Student 57
Student 58
add1
add2
*****************************
We see they are added successfully

Try add another student to cs101
The class is full!
New course information:
*****************************
Courese Title: cs101
Instructor: John
Class size: 60
The student list:
Student 1
Student 2
Student 3
Student 4
Student 5
Student 6
Student 7
Student 8
Student 9
```

```
Student 10
Student 11
Student 12
Student 13
Student 14
Student 15
Student 16
Student 17
Student 18
Student 19
Student 20
Student 21
Student 22
Student 23
Student 24
Student 25
Student 26
Student 27
Student 28
Student 29
Student 30
Student 31
Student 32
Student 33
Student 34
Student 35
Student 36
Student 37
Student 38
Student 39
Student 40
Student 41
Student 42
Student 43
Student 44
Student 45
Student 46
Student 47
Student 48
Student 49
Student 50
Student 51
Student 52
Student 53
Student 54
Student 55
Student 56
Student 57
Student 58
add1
add2
****************************
We cannot do that since the class is full

```

```
Try to remove a student from cs102
This student is not erolled in the course!
New course information:
*****************************
Courese Title: cs102
Instructor: John
Class size: 6
The student list:
Student 1
Student 2
Student 3
Student 4
Student 5
Student 6
*****************************
We see the student is successfully removed

Try to remove another student from cs102
This student is not erolled in the course!
New course information:
*****************************
Courese Title: cs102
Instructor: John
Class size: 6
The student list:
Student 1
Student 2
Student 3
Student 4
Student 5
Student 6
*****************************
No one is removed this time because we've set that a class must have at lest 5
    students

Now, try to remove a student who's not enrolled in cs103.
The student is: Josh
This student is not erolled in the course!
New course information:
*****************************
Courese Title: cs103
Instructor: John
Class size: 6
The student list:
Student 1
Student 2
Student 3
Student 4
Student 5
Student 6
*****************************
So we can see nothing's changed

Try to let John teach cs104 as well
```

```
A professor can only teach 3 classes!
*****************************
Courese Title: cs104
Instructor: Jane
Class size: 6
The student list:
Student 1
Student 2
Student 3
Student 4
Student 5
Student 6
*****************************
We see we cannot do that since John is already teaching 3 classes!

_____________________________
Professor name: John
The Professor is teaching 3 classes:
cs101
cs102
cs103
_____________________________

_____________________________
Professor name: Jane
The Professor is teaching 1 classes:
cs104
_____________________________
We can see nothing is changed. They are still teaching the same classes.

Let Jane teach cs102, and then try assign John to cs104

_____________________________
Professor name: John
The Professor is teaching 3 classes:
cs101
cs103
cs104
_____________________________

_____________________________
Professor name: Jane
The Professor is teaching 1 classes:
cs102
_____________________________

So we can see it changes as we expected.
baoyechen@BaoyedeMacBook-Air BaoyeChen_hw3_submission %
```

Course Output.txt