

Universal Parabolic Constant

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Contents

1	Universal Parabolic Constant	2
1.1	Description	2
1.2	Properties	2
2	Interview	3
2.1	Criteria for the selection of the interviewee	3
2.2	Interviewee	3
2.3	Questions & Answers	3
2.4	Analysis	4
3	User Persona	5
4	Problem Domain	8
4.1	Description	10
4.1.1	User	10
4.1.2	Operator	10
4.1.3	Operand	10
4.1.4	Operation	10
4.1.5	Constant	10
5	Activity Diagram	11
5.1	Description	11
6	Use Case Diagram	13
6.1	Description	15

Chapter 1

Universal Parabolic Constant

1.1 Description

The Universal parabolic constant is a mathematical constant and is defined as the ratio, for any parabola, of the arc length of the parabolic segment formed by the latus rectum to the focal parameter. The focal parameter is twice the focal length. The ratio is denoted P . Just as the ratio of the arc length of a semicircle to its radius is always pi, the ratio P of the arc length of the parabolic segment formed by the latus rectum of any parabola to its semilatus rectum (and focal parameter) is a universal constant. The other conic sections, namely the ellipse and hyperbola, do not have such universal constants because the analogous ratios for them depend on their eccentricities. In other words, all circles are similar and all parabolas are similar, but the same is not true for ellipses or hyperbolas.

The value of P is,

$$P = \ln(1 + \sqrt{2}) + \sqrt{2} = 2.29558714939 \quad (1.1)$$

In the diagram (Fig 1), the latus rectum is pictured in blue, the parabolic segment that it forms in red and the focal parameter in green. (The focus of the parabola is the point F and the directrix is the line L .)

1.2 Properties

- P is an irrational number.
- It is also a transcendental number.

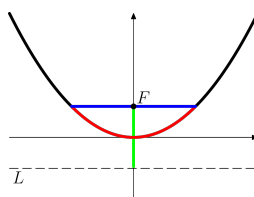


Figure 1.1: The universal parabolic constant is the red length divided by the green length.

Chapter 2

Interview

2.1 Criteria for the selection of the interviewee

- The interviewee should have experience in dealing with constants such as Universal Parabolic Constant.
- Since Universal Parabolic Constant is being applied in various contexts, Interviewee can be from Mathematics or Physics background.

2.2 Interviewee

Name : Srividya Murugan

Email : srividya92.sv@gmail.com

Background : She has done Master's in Applied Mathematics.

2.3 Questions & Answers

Q: How long have you been working with constants?

A: 3 years

Q: Why do we need constants in Math?

A: Mathematical Constants have the value which is fixed by a definition. It will be used across multiple mathematical problem.

Q: How is Universal Parabolic Constant applied?

A: It is not widely used. But it is used in specific complex applications. Eg. Parabolic Bridge

Q: How is Universal Parabolic Constant applied?

A: It is not widely used. But it is used in specific complex applications. Eg. Parabolic Bridge (Physics).

Q: What is the constant's value?

A: It is a fixed value that can be derived from the below equation.

$$P = \ln(1 + \sqrt{2}) + \sqrt{2} = 2.29558714939 \quad (2.1)$$

Q: How often you use this constant in your research area?

A: I use this constant in my study frequently.

Q: Do you use calculator often?

A: Yes.

Q: Do you find it hard to use the irrational numbers while using the calculator?

A: Yes. It is quite difficult to type irrational numbers with the other numbers. It is not easy to double check.

Q: Will integrating this constant in the calculator make your calculation easy?

A: Yes.

Q: Do you want to display the symbol or the irrational number in the calculator?

A: Symbol would be fine.

2.4 Analysis

It is obvious that Mathematicians need an efficient way to use these constants in the calculator. They find it hard to type irrational numbers in the calculator since they use these numbers often in their study. They need these constants in the calculator which would make their calculation easy.

Chapter 3

User Persona

Srividya Murugan

Student

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Chennai, Tamilnadu, 600006
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✉ srividya92.sv@gmail.com
🐦 [sri_vidya06](https://twitter.com/sri_vidya06)



Background

- 2010–2013 **Honors High School Diploma**, *Chellammal Vidhyalaya*, Chennai, India.
GPA - 3.5
- 2014–Present **Integrated Masters (Applied Mathematics)**, *Anna University*, Chennai, India.
GPA - 3.0 | Major: Maths

Bio

Extra comments if required

Srividya is a Mathematics Student based out from India. He has been passionate about Mathematics from young age and over the time have solved various complex problems. Other than Mathematics Srividya likes to keep herself busy in updating herself. Srividya prefers to spend his free time playing video games

Computer Skills

Expertize level Word, Excel, Powerpoint, Publisher

Goals

Other Bob wishes to continue pursuing his career as Professor.

Strong Suites

- fast and accurate typing
- use shortcuts
- Analytical
- Quick learning

Needs

- Srividya wants to solve very complex problems.
- Multiple files management.

Frustrations

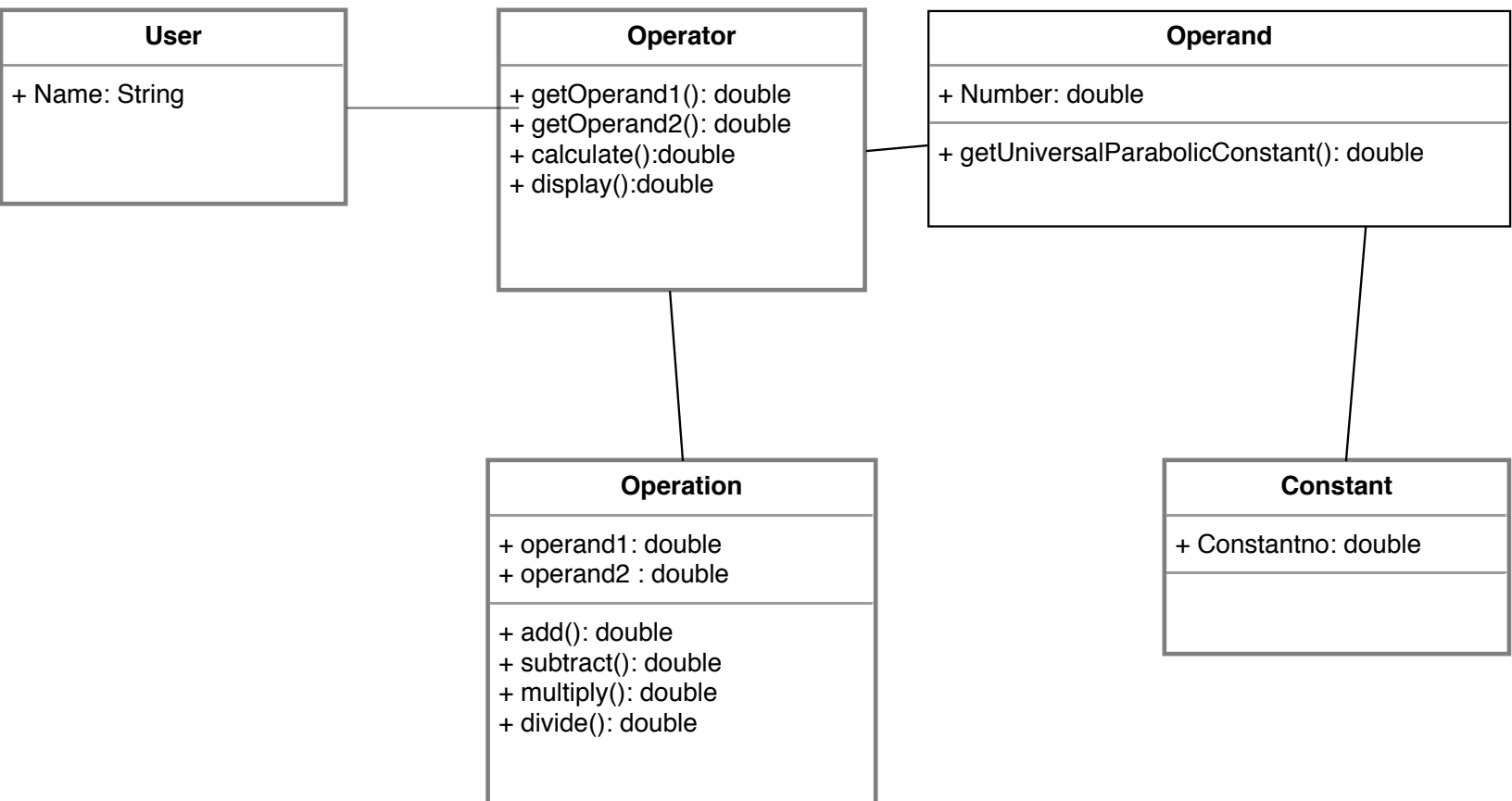
- Tutoring: Various Students in Science and Math

Environments

- Cubicle
- Home

Chapter 4

Problem Domain



4.1 Description

A calculator has 4 operators which are Add, Subtract, Multiply, Divide.

4.1.1 User

A user is a person who is using the calculator.

4.1.2 Operator

A user can use an operator to perform his calculation.

4.1.3 Operand

Operand class shall be used to get all the irrational number.

4.1.4 Operation

Addition, subtraction, multiplication and division are performed by this class.

4.1.5 Constant

This class is for the Universal parabolic constant.

Chapter 5

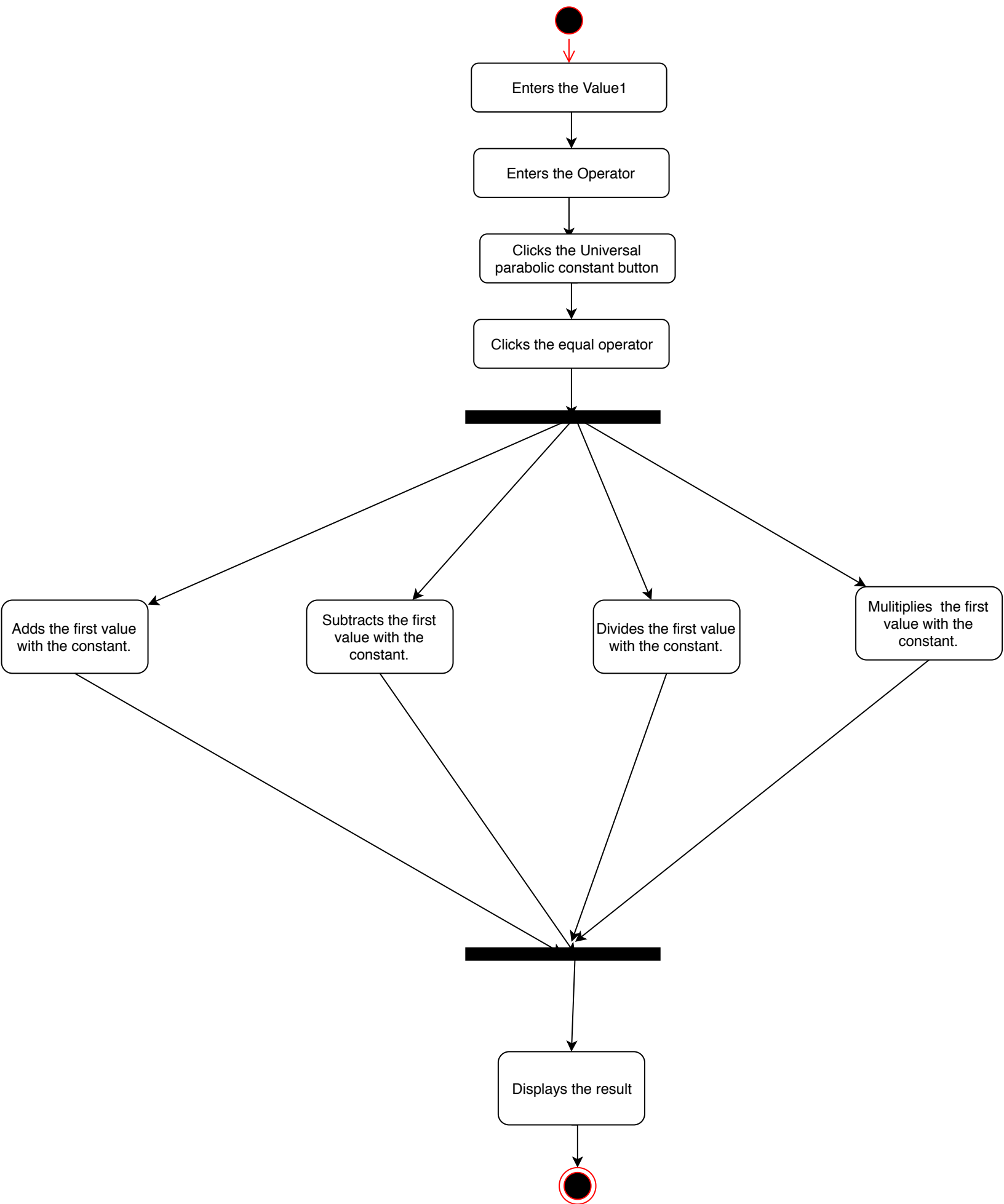
Activity Diagram

5.1 Description

The user enters the operands and the operator. Here, we have considered universal parabolic constant as the second operand. Once the user clicks equal operator, corresponding operations will be performed on operands.

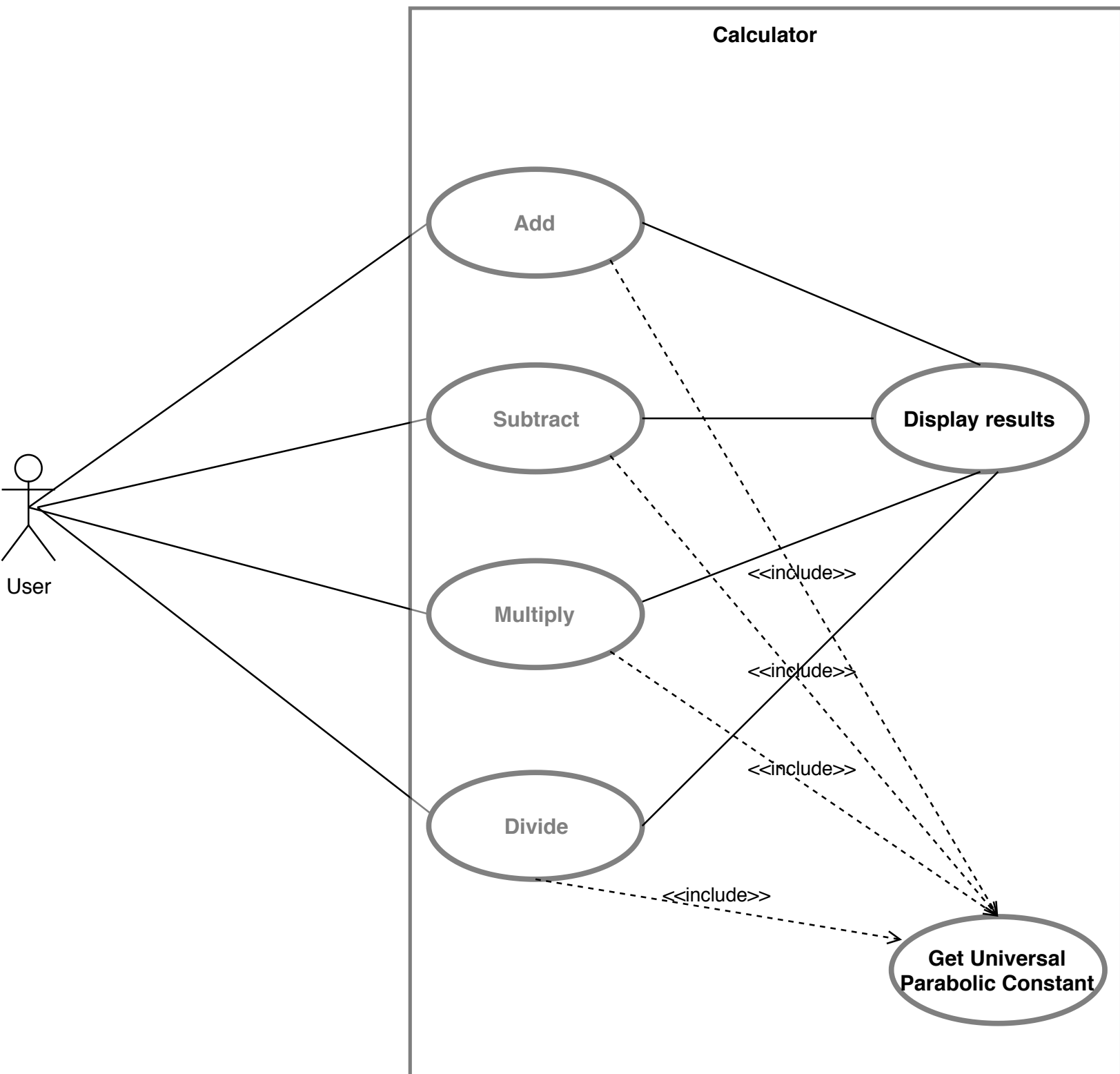
- If the user selects the "Add" function then the first and constant value will be added
- If the user selects the "Subtract" function then the constant will be subtracted from the first number.
- If the user selects the "Multiply" function then the first and constant value will be Multiplied
- If the user selects the "Divide" function then the first will be divided by the constant.

Finally, results will be displayed.



Chapter 6

Use Case Diagram



6.1 Description

- The goal of the "Add" Use case is to add the two numbers.
- The goal of the "Sub" Use case is to subtract the two numbers.
- The goal of the "Multiply" Use case is to Multiply the two numbers.
- The goal of the "Divide" Use case is to divide the two numbers.
- The goal of the "Get Universal Parabolic Constant" Use case is to get the constant.

Finally, the goal of the "Display" use case is to display the results of the calculation.