CONCORDIA UNIVERSITY
DEPARTMENT OF COMPUTER SCIENCE AND SOFTWARE ENGINEERING

A Project Report on
ETERNITY: NUMBERS
Problems 1-7
SOEN 6481

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Abstract

The main theme of the project revolves around Irrational Numbers and Constructing a calculator. Each individual in the team are assigned a Irrational Number, they have to get information about the number from various sources.

In this process each person should interview unique person, who has knowledge on the respective number they have to deal with. These persons can be Mathematicians,Ph.D students, professors,etc. On interviewing them we get a problem statement. So the project will run on this Problem statement.

We have to build the calculator with the problem statement in the mind. We have to include all the features which are mentioned in the problem statement. The project ends by solving the problem statement.

Repositary: `https://github.com/Saikiran-Alagatham/SOEN6481`

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Gelfond's Constant

1 Introduction

Gelfond's Constant is a Transcendental Number, a Transcendental Number is a number which is not an Algebraic number. This constant is named after Aleksandr Gelfond and it is represented as e^{π} that is e raised to the power Pie.

The value of Gelfond's constant is:

$$e^{\pi} = 23.140692632779269005729086367948547 38.\ldots\ldots$$

Where $e^{\pi} = e^{\pi}i - i = (-1)^{-}i$

Here i is imaginary, Since -i is not algebraic, we can say e^{π} is Transcendental.

1.1 Usage

This constant is used in
* Gelfond–Schneider theorem
* Hilbert's seventh problem
* Ramanjuna's Constant

1.2 Construction

Assume $k_0 = \frac{2}{3}$ and

$$k_n + 1 = \frac{1 - \sqrt{1 - {k_n}^2}}{1 - \sqrt{1 + {k_n}^2}} s$$

When $n > 0$ the sequence expands and becomes

$$e^{\pi} = 23 + \cfrac{1}{7 + \cfrac{1}{9 + \cfrac{1}{3 + \cfrac{1}{1 + \cfrac{1}{1 + \cfrac{1}{591 + \frac{1}{\ldots}}}}}}}$$

2 Interview

1.What best defines you?
I'm Dr D Srinivas Reddy, a Professor at Jawaharlal Nehru Technical University Hyderabad. I have 15 years of experience in this field , worked in various collages and universities across India. **Fluid Mechanics** and **Mathematical Model** , these are my areas of specialization.

2.Numbers and constants(e.g pie) , How important are they in your field?
According to me 'e' and 'pie' are most important constants in mathematical field. 'e' is used mainly in Accounts and Banking sector , Where as 'Pie' in Geometry. One would assume they would get more interest for a sum per year, compared to six months or 3 months or each month. 'e' helped to clear that assumptions.

3.What do u know about Gelfond's constant?
Not Much, apart from that it used in gelfond-schneider theorem and hilbert's seventh problem.

4.What are the uses of Gelfond's constant and what will the future?
The same hilbert's seventh problem and gelfond-schneider theorem. Regarding future of the constant, I think it pretty much remain the same.

5.What are the requirements to build a calculator to perform operations on constants?
The main factor would be the precision , especially when it comes to multiplying constants and presenting the result with appropriate decimal point .

6.Which the most widely used constant and what is its significance?
I would pick Pie, because of its huge impact in geometrical field. The other would be golden ratio(1.6168) , even this belong to the same family of Pie.

7.What device do you generally use for the complex calculations in your field?
A regular calculator and a Scientific Calculator. If it's really different I use a site called 'vCalc', it offers a huge range of scientific formula related calculators.

8.What kind of user interface would you like for the device?
A simple regular interface, with standard layout of buttons, because if its personalized to yourself then we can't build a standard calculator which can be used all.

9.What are the features u wish u had in a modern calculator?
I want to add personalized buttons which I use mostly during calculations, that being said it will not become a standard calculator. So A button to store a value that I want to store will be fine.

3 Perosna

Dr. Srinivas Reddy

Mathematician

Gender : Male

Age : 39

Email: sd.srinivasreddy @vardhaman.org

Country: India

Skills

Experience

Dr D Srinivas Reddy is a Professor at Vardhaman College of Enginnering,Hyderabad. He has experience over 15 years in the teaching field and a visiting professor for JNT University Hyderabad. He is presently working on extend version of Fluid Mechanics.

Interest

He has ample of experience in Mathematical field. He completed his Masters in Applied Mathematics and his Ph.D in Mathematics. Subjects like Mathematics-I, Mathematics-II, Mathematics-III, PTNM and MFAE were thought by him across various universities and colleges.

Likes|Dislikes

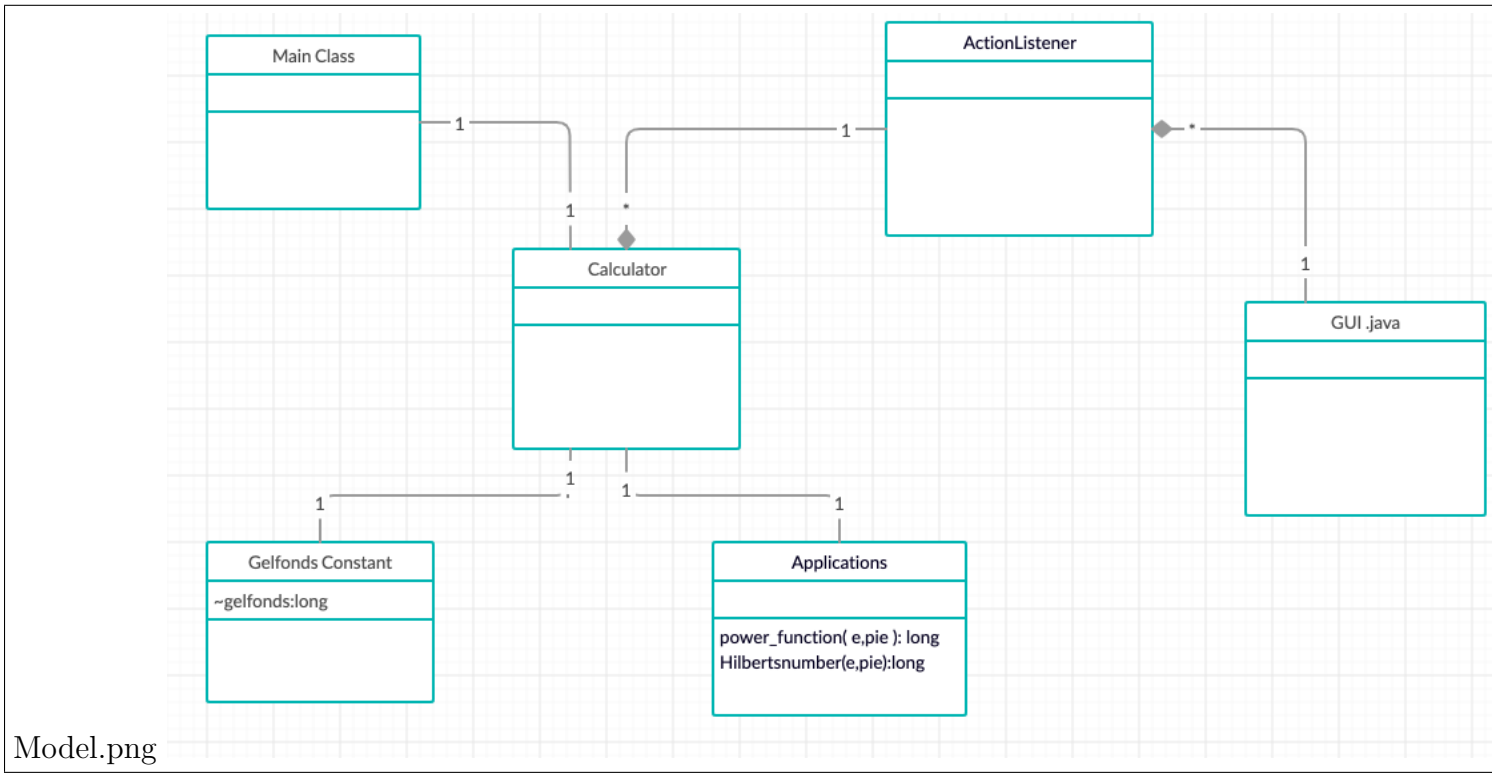
He likes teaching Maths to students, especially Mathematical related theorems. He published 9 papers which are related to mathematical and applied quantum physics field. He uses 'Vcalc' and scientific calculator for any major calculations.

Business Values

Srinivas requires a simple calculator with major constants built in, so that it won't resemble a scientific calculator. He wants a personalized button so that users can feed/program there own operation. Those operations are dependent on the user, so it varies from user to user.

4 Domain Model

The practice (or, equivalently, act) of constructing a domain model.The construction of a domain model requires the experience and expertise of business analysts, (conceptual) modeling specialists (that are internal to a project team) and domain experts or subject-matter experts (that can be external to a project team).



Model.png

Figure 1: **Domain Model.**

5 Usecase Model

A use case model for a software system is the set of all actors, and the set of all use cases, and the relevant relationships among them. A use case model provides view of a system that emphasizes the behavior as it appears to external (or outside) users. A use case model does not address internals of a software system (such as data structures or algorithms used).

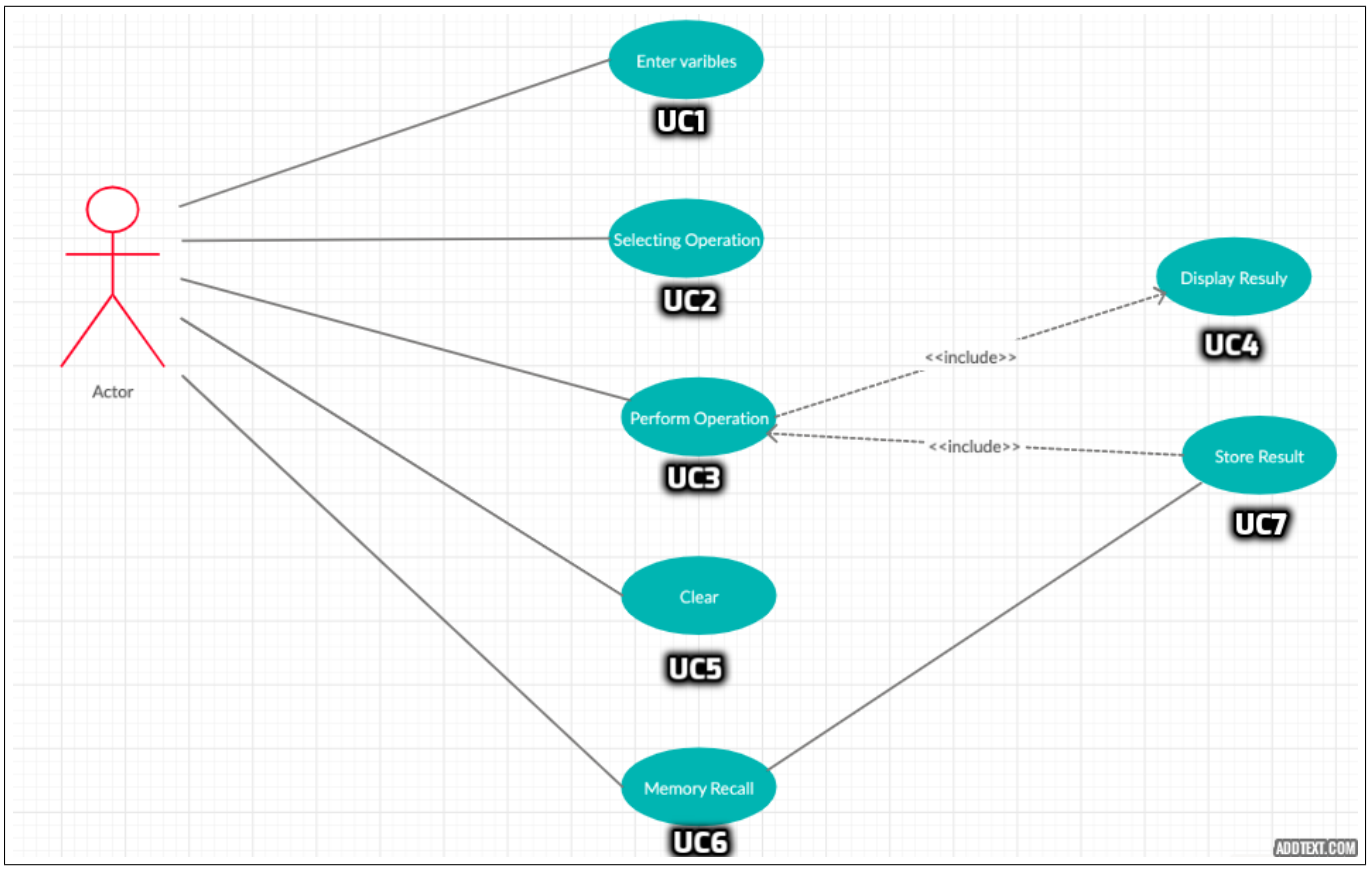
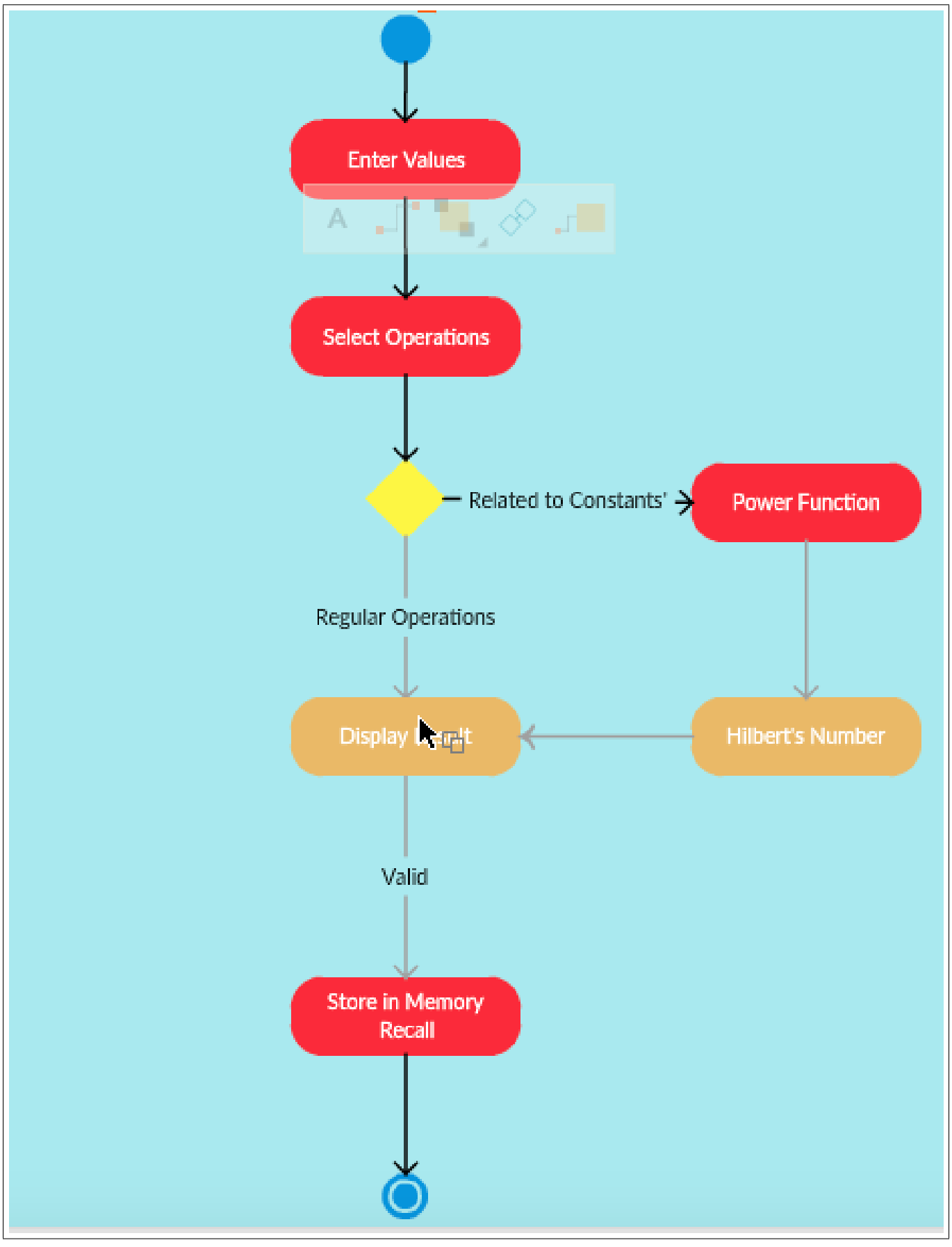


Figure 2: **UseCase Diagram.**

5.1 Activity Diagram



6 User Stories

Structure of a User Story:
As <a type of user>, I want to <perform some task> so that I can <achieve some goal>.

US == User Story

US1:As a regular user , I want to perform basic arithmetic calculations so that it will help for daily usage.

US2:As a Mathematician, I want a button which stores Gelfond's Constant that has been calculated for ease of use.

US3:As a Teacher User, I want to add some major constants to calculator so that I can easily perform operations on them during lecture.

US4: As a Mathematician, I want a button to set precision of calculations so that I get desired decimal values.

US5:As a user , I want a separate button to store my desired value so that I can use them frequently without typing again and again.

US6:As a regular User, I want to store values to memory so that I can recall them Whenever I want to add some values to them.

6.1 User Story 1: Arithmetical Operations

ID	US1
Description	As a regular user , I want to perform basic arithmetic calculations so that it will help for daily usage.
Priority	High
Points	8
Constraints	

6.2 User Story 2: Gelfond's Constant

ID	US2
Description	As a Mathematician, I want a button which stores Gelfond's Constant that has been calculated for ease of use.
Priority	High
Points	8
Constraints	

6.3 User Story 3: Adding Constants

ID	US2
Description	As a Teacher User, I want to add some major constants to calculator so that I can easily perform operations on them during lecture
Priority	Medium
Points	5
Constraints	

6.4 User Story 4: Precision

ID	US2
Description	As a Mathematician, I want a button to set precision of calculations so that I get desired decimal values.
Priority	Medium
Points	3
Constraints	Decimal values should be displayed up to 16 digits.

6.5 User Story 5: Personalised Button

ID	US2
Description	s a user , I want a separate button to store my desired value so that I can use them frequently without typing again and again
Priority	Low
Points	2
Constraints	Must Store all types of values apart characters.

6.6 User Story 6: Memory Recall

ID	US2
Description	As a regular User, I want to store values to memory so that I can recall them Whenever Iwant to add some values to them
Priority	Low
Points	1
Constraints	Must Store 1 value.

7 Backward Trace ability Matrix

user story identifiers, in the same order, can be placed in the first rows as well as in the first column of a matrix, and then user stories that are related in some manner could be highlighted by placing a marker in the appropriate row/column of the matrix

User Stories	**Use Case**	**Interview**	**Surveys**	**Global**	**Persona**
US1	UC-3	X			
US2	X				
US3		X			X
US4		X			
US5		X			X
US6	UC7	X	X		X

8 References

1.https://en.wikipedia.org/wiki/Gelfond%27s_constant
2.https://vardhaman.org/team/dr-d-srinivas-reddy/
3.https://users.encs.concordia.ca/~kamthan/courses/soen-6481/interviews_introduction.pdf
4.https://users.encs.concordia.ca/~kamthan/courses/soen-6481/user_modeling_introduction.pdf
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6.https://users.encs.concordia.ca/~kamthan/courses/soen-6481/user_stori7.es_context.pdf
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9.https://users.encs.concordia.ca/~kamthan/courses/soen-6481
10.https://www.google.com/search?q=java+calculator+tutorial

Repositary: https://github.com/Saikiran-Alagatham/SOEN6481