

CONCORDIA UNIVERSITY  
DEPARTMENT OF COMPUTER SCIENCE AND SOFTWARE  
ENGINEERING

A Project Report on  
ETERNITY: NUMBERS  
Problems 1-5

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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.

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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  $e^\pi$  that is e raised to the power Pie.

The value of Gelfond's constant is:

$$e^\pi = 23.14069263277926900572908636794854738.....$$

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

Here i is imaginary, Since -i is not algebraic, we can say  $e^\pi$  is Transcendental.

## Usage

This constant is used in

- \* Gelfond-Schneider theorem
- \* Hilbert's seventh problem
- \* Ramanjuna's Constant

## 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

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

## 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



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#### Skills



## Dr. Srinivas Reddy

Mathematician

### Experience

Dr D Srinivas Reddy is a Professor at Vardhaman College of Engineering, 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).

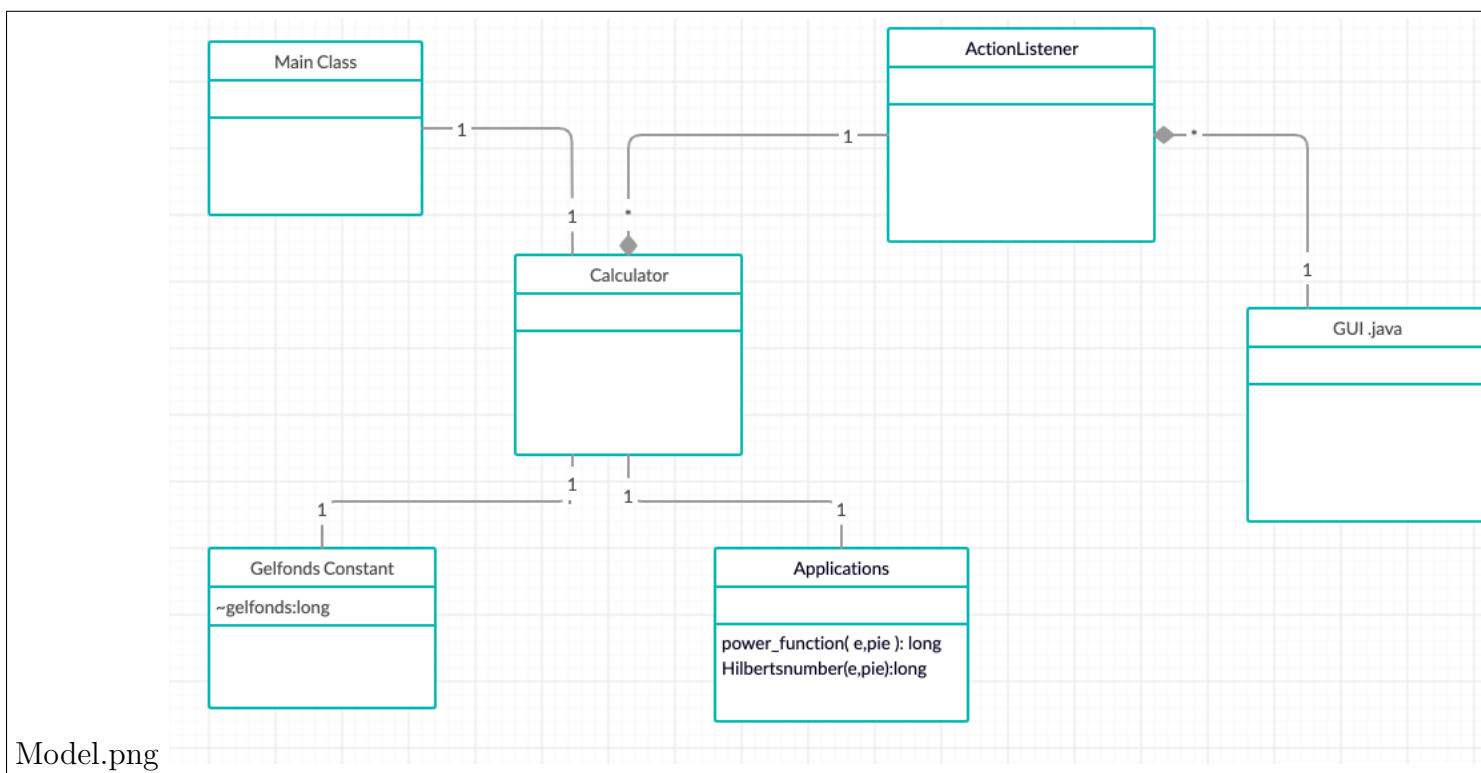


Figure 1: Domain Model.

## 5 Usecase Model

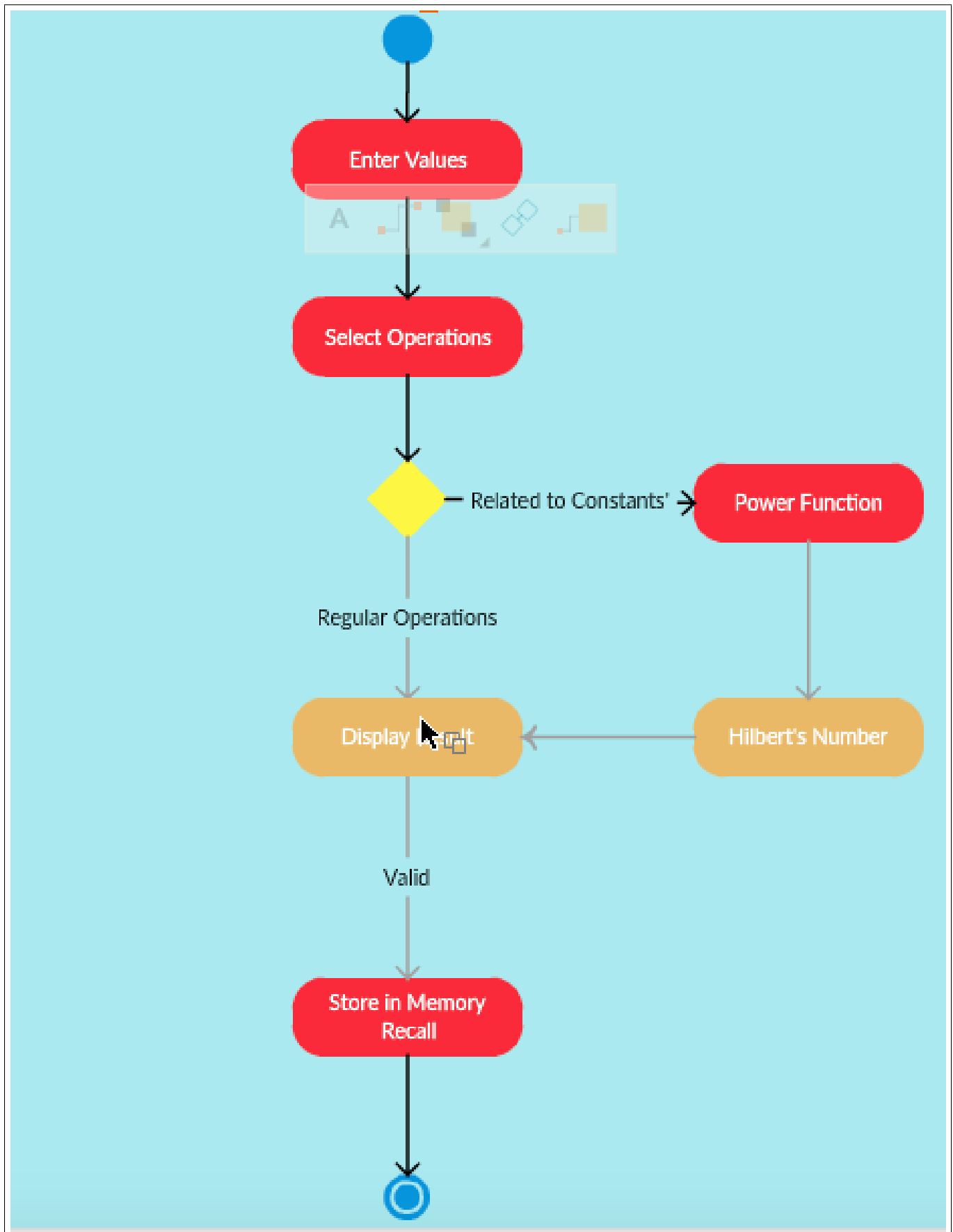
A use case model for a software system is the set of all actors, and the set of all use cases, and the relevant relationships among them. A use case model provides view of a system that emphasizes the behavior as it appears to external (or outside) users. A use case model does not address internals of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



Figure 2: UseCase Diagram.



## Activity Diagram



## 6 References