Gelfonds Constant

Saikiran Alagatham

Objectives

- The main theme of the project revolves around Irrational Numbers and Constructing a calculator.
- Each individual is assigned with a Irrational Number, they have to obtain information about the number from various sources like Interviews,Surveys.
- From the Interviewee, We have to collect the requirements to build the Calculator. All the features mentioned must be implemented.

Gelfonds Constant

- Gelfond's Constant is a Transcendental 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: $e^{\pi} = 23 : 140692632779269005$
- Where $e^{\pi} = e^{\pi i} = (-1)^{1}$. Here i is imaginary, Since -i is not algebraic, we can say e^{π} is Transcendental.
- Here i is imaginary, Since -i is not algebraic, we can say $e^{\pi i}$ is Transcendental.

Challanges Faced

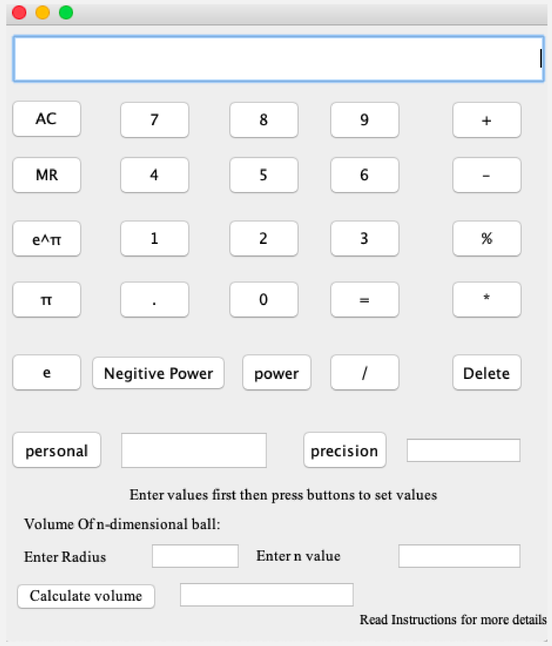
- One of the big challenges was calculation and extraction of the Gelfonds constant. A regular power function does not support Double power Double style . Because the storage variable isnt big enough to store the result.
- Gathering enough information about the constant was a big deal too. Since the constant is not widely used and known.
- Applications of the constant are limited, since the constant is intermediate value for calculation gelfond schneider theorem. -It became extremely difficult to find the real world usage of the constant.

Taylor series

A Taylor Series is an expansion of a function into an infinite sum of terms, with increasing exponents of a variable, like x, x2, x3, etc.
The Taylor Series for ex

$$e^{x} = 1 + x + \frac{x^{2}}{2!} + \frac{x^{3}}{3!} + \frac{x^{4}}{4!} + \frac{x^{5}}{5!} + \dots$$

Design



Application

The n-dimensional volume of a Euclidean ball of radius R in n-dimensional Euclidean space is:
$V_n = \frac{\pi^{(n/2)} R^n}{\pi(n/2+1)}$
If R is even then: $V_2 n = \frac{\pi^2 n}{\pi} * R^n$

Lessons Learned

- By this project I came to know that irrespective of Personal or Private project, the design and format has to be standard.
- Looking at a problem in all the perspectives in order to get a accurate result. Especially in case of deriving mathematical values

Conclusions

- The requirements stated has been met by appropriately implementing them.
- I Sufficient Knowledge on the constant and itâĂŹs background details had been collected and understood.
- The challenges faced during implementation are successfully handled.

Interesting things

- Even though this constant is used in Gelfond schneider theorem, it is still considered as application to the theorem. IsnâĂŹt it Interesting?
- This constant is used to calculate Volume of n-ball, here n is dimension. Can you imagine a ball which has n-dimensions, Like 3D,5D,8D.
- RamanujanâĂŹs constant: $e^{\pi}\sqrt{163}$ is based on Gelfonds constant. Ramanjunas constant can be written as $(Gelfondsconstant)^{\sqrt{163}}$