SOEN 6011 PROJECT DELIVERY ONE CALCULATOR OF FUNCTION 3(CF3) APPLICATION

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1 Function Description

$\sinh x$ is a transcendental function and it is defined as following(Formula 1). For reference purpose, identifier F3 is used.

$$F3 : \sinh x = \frac{e^x - e^{-x}}{2} \tag{1}$$

The graph of F3 is shown by Figure 1.1, the domain of F3 is **R** and the co-domain of F3 is also **R**. F3 is an odd function and y always increases with the increase of x.

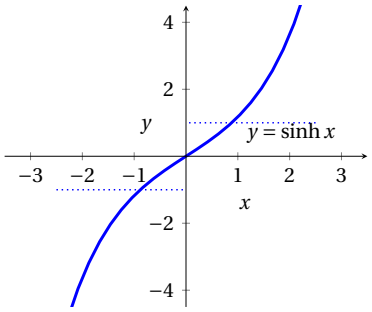

Figure 1: Graph of F3

Main characteristics of F3 is listed as below with proofs[1].

- F3 is an odd function.

$$\sinh x = -\sinh x \tag{2}$$

- F3 is one-to-one.

$$\frac{e^m - e^{-m}}{2} = \frac{e^n - e^{-n}}{2} \Leftrightarrow m = n \tag{3}$$

- F3 is onto.

$$\forall x \epsilon R, \exists y \epsilon R, \sinh x = y \tag{4}$$

- F3 is bijective function from **R** to **R**.

2 Requirements Specification

2.1 Purpose

The purpose of this section is to give a detailed description of the requirements for the "calculator of F3"(CF3). It will illustrate the system constraints, assumptions, interfaces, functional and quality requirements of the system.

2.2 Definitions, acronyms, and abbreviations

Term	Definition
CF3	Calculator of F3, the name of the system.
User	Someone who interacts with CF3.
Stakeholder	Any person who has interaction with the system who is not a developer.
DESC	Description
RAT	Rational
DEP	Dependency
TAG	A unique, persistent identifier contained in a PLanguage statement[2]
GIST	A short, simple description of the concept contained in a PLanguage statement[2]
SCALE	The scale of measure used by the requirement contained in a PLanguage statement[2]
METER	The process or device used to establish location on a SCALE contained in a PLanguage statement [2]
MUST	The minimum level required to avoid failure contained in a PLanguage statement[2]
WISH	A desirable level of achievement that may not be attainable through available means contained in a PLanguage statement[2]

2.3 Constraints and Assumptions

The CF3 application is constrained by the hardware and the maximum output that CF3 could calculate is 3.40282346638528860e+38 while the minimum output is -3.40282346638528860e+38.

One assumption about the CF3 application is that it will always be used to calculate numbers within constrained range which is (- 89.41598623262829836363, 89.41598623262829836363).

2.4 Interfaces Requirements

The user interface should be Text-based User Interface(TUI). All interface requirements have high priority and they are normal difficulty.

ID: IR1

TITLE: Input a number

DESC: When program is executed, the user shall be able to see the instructions to input a number within 1s.

RAT: In order to input a number for calculation.

DEP: None

ID: IR2

TITLE: Show not-a-number error

DESC: When the input is not a valid number, the user shall be able to see an error message within 1s.

RAT: In order to make sure the input is a number.

DEP: IR1

ID: IR3

TITLE: Show out-of-bound error

DESC: When the input is not within the constrained range, the user shall be able to see an error message within 1s.

RAT: In order to make sure the output and calculation are within the CF3 application constraints.

DEP: IR1

ID: IR4

TITLE: Repeat inputs

DESC: When after user see error messages, the user shall be able to see instructions to input a number.

RAT: In order to make sure that user should input again after seeing error messages.

DEP: IR2, IR3

ID: IR5

TITLE: Output the result

DESC: When recieved a valid input, the user shall be able to see the calculated

result.
RAT: In order to output the calculated result.
DEP: IR1

2.5 Functional Requirements

This section includes the requirements that specify all the fundamental actions of the software system.

ID: FR1
TITLE: Execute the application
DESC: When double click .exe file at a computer, the user shall be able to execute the application.
RAT: In order for a user to execute the application.
DEP: None

ID: FR2
TITLE: Input a number
DESC: When execute the application, the user shall be able to input a number.
RAT: In order to get the input for calculation.
DEP: FR1

ID: FR3
TITLE: Output a result
DESC: When a valid input is received, the user shall be able to get the calculated result within 1s.
RAT: In order to output the calculated result
DEP: FR2

ID: FR4
TITLE: Validate input
DESC: When an input is received, the CF3 application shall validate the input within 1s.
RAT: In order to make sure the input is valid.
DEP: FR2

2.6 Performance Requirements

ID: QR1
TITLE: ResponseTime
GIST: The fastness of the calculation
SCALE: The response time of the calculation
METER: Measurements obtained from 100 calculations
MUST: No more than 0.5 second 100 percent of the time
WISH: No more than 0.1 second 100 percent of the time
DESC: When an input is received, the CF3 application shall validate the input within 1s.
RAT: In order to make sure the input is valid.

ID: QR2
TITLE: Application testability
DESC: Test environments should be built for the application to allow testing of the applications different functions.
RAT: In order to test the application.

ID: QR3
TITLE: SystemReliability
GIST: The reliability of the system
SCALE: The reliability that the system gives the right result on a calculation
METER: Measurements obtained from 100 calculations during testing
MUST: 100 percent of the calculations

2.7 Prioritization and Difficulty

In order to get a view of how to divide the requirements into different iterations, following gives the priority and difficulty of the requirements.

Table 1: Priority and Difficulty of the Requirements

ID	Priority	Difficulty
IR1	High	Easy
IR2	High	Easy
IR3	High	Easy
IR4	Medium	Normal
IR5	High	Easy
FR1	Medium	Easy
FR2	High	Easy
FR3	High	Easy
FR4	High	Normal
QR1	High	Normal
QR2	Medium	Normal
QR3	Medium	Normal

References

[1] mathcentre, Universities of Loughborough
http://www.mathcentre.ac.uk/resources/workbooks/mathcentre/hyperbolicfunctions

[2] Feldt R $re_lecture5b_100914, unpublished$