
SOEN 6011 PROJECT DELIVERY ONE

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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.

$$F3 : \sinh x = \frac{e^x - e^{-x}}{2} \quad (1)$$

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

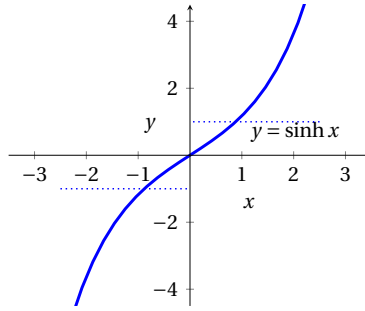


Figure 1: Graph of F3

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

- F3 is an odd function.

$$\sinh x = -\sinh x \quad (2)$$

- F3 is one-to-one.

$$\frac{e^m - e^{-m}}{2} = \frac{e^n - e^{-n}}{2} \Leftrightarrow m = n \quad (3)$$

- F3 is onto.

$$\forall x \in \mathbf{R}, \exists y \in \mathbf{R}, \sinh x = y \quad (4)$$

- F3 is bijective function from \mathbf{R} to \mathbf{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 Version

References

[1] mathcentre, Universities of Loughborough

<http://www.mathcentre.ac.uk/resources/workbooks/mathcentre/hyperbolicfunctions>

[2] Feldt R

"lecture5b100914", unpublished.