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.

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

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.

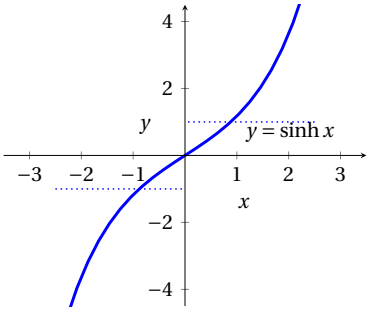

Figure 1: Graph of F3

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

- F3 is one-to-one.

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

- F3 is onto.

$$\forall x \epsilon R, \exists y \epsilon R, \sinh x = y \tag{3}$$

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

References

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