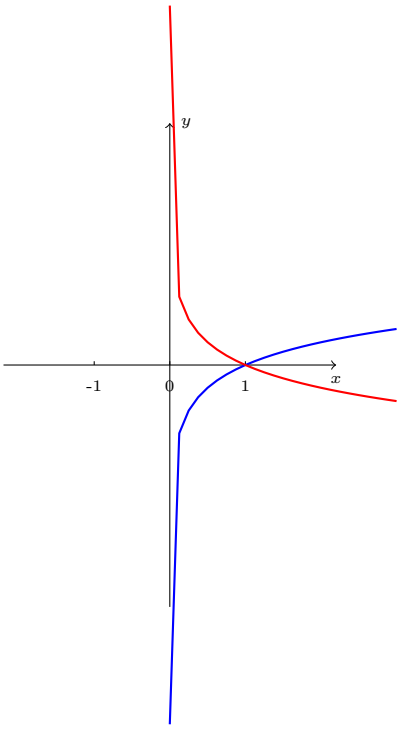
Problem 1

Logarithmic function : f(x) = $\log_b X$



BLUE LINE : f(x) = $\log_{10} X$ $REDLINE : f(x) = \log_{0.5} X$

DOMAIN: b:(0,1)∪(1, +∞) $X : (0, +\infty)$

CO-DOMAIN: R

CHARACTERISTICS:

Fixed point: Function image is always over fixed point (1,0).

Monotonicity: when a>1, it is a monotonic increasing function in the domain of definition.

Parity: Non-odd and Non-even Functions

Periodicity: not a periodic function

Symmetry: None

Null point: X=1

Problem 2

1. Problem description

Develop a Java system to calculate the result for the Logarithmic function : f(x) = $\log_b X$.

2. Requirements

a .When the system starts, the console should display the function name and allow the user to select the logarithmic function.

-Type attribute: Functional

b . The primary requirement to the function is to have only two number value as input to the function.

-Type attribute: Design Constraints

c . In case any other form of input is given, the program should prompt an effective error message to the user.

-Type attribute: Functional

d . The function accepts only a real number as its input argument. Hence, it is the responsibility of the program/function to change the illegal input to the desired input needed for it to work efficiently.

-Type attribute: Design Constraints

e .If the base is valid, the system should ask the user to input the value for variable and set it.

-Type attribute: Functional

f.If the variable is valid, the system should calculate the logarithm of in base without relying on java built-in functions, and store the result.

-Type attribute: Functional

g .After the calculation completes, the system should display the result on the console.

-Type attribute: Functional

h. The calculation result shall be accurate to 6 decimal places.

-Type attribute: Performance

3. Constraints

There are few constraints that need to be followed:

a . Apart from the functions related to input, output and arithmetic, use of any built-in functions provided in Java is prohibited.

b . The domain of f(x) is b : (0,1)$\cup(1,+\infty)$ $X : (0,+\infty)$

4. Assumptions

a . We assume that the user interface will be text-based, depending on console input and output.

b . User gives input for both X and a value.

c . The 'Java system' refers to the scientific calculator

d . Users may enter illegal characters such as letters or non-real numbers..

5. References

a .Shapiro, J. F., Shapiro, J. F. (1979). Mathematical programming: structures and algorithms (No. 04; QA402. 5, S4.). New York: Wiley.

b . Riddhi, D. (2008). Beta function and its applications. The University of Tennesse, Knoxville, USA.[online] Available from: http://sces.phys.utk.edu/moreo/mm08/Riddi

c .Olver, F. W., Lozier, D. W., Boisvert, R. F., Clark, C. W. (Eds.). (2010). NIST handbook of mathematical functions hardback and CD-ROM. Cambridge university press. Chicago Chicago