ASSIGNMENT 2 DESIGN DOCUMENT

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1 Goal

Write a simple math library containing functions to calculate PI, e, and square root. Additionally, write a test harness allowing a user to input command line options in order to run each library function. Include statistics for each function run, as well as comparisons to C's math.h library values.

2 Pseudocode

TEST HARNESS

-This is a main function using GETOPT: Allows the user to run and display the various math functions from the terminal

-Include mathlib.h (the header for the assignment math library), math.h (C's standard math library) and unistd.h (for getopt)

-Specify the command line options: "saebmrvnh"

-using a switch statement, write cases for each option

-every option besides -h will toggle a variable to 1, corresponding to each function

-EX: if -e is input, etoggle = 1

-h instead displays a help message and returns 1 to terminate the program

-after the switch statement, check each the value of each toggle variable

-if a variable is set tot 1 (meaning the option has been input into the terminal), run the corresponding math function and compare the returned value to C's math function's return

SQRT FUNCTION

-This function calculates the sqrt of a value (to a certain accuracy) and keeps track of the iterations the function takes to reach said accuracy

-accuracy is determined by EPSILON, which is a small value given to us

-uses a for loop

-exit condition is when the absolute value of the previous guess for the sqrt - the current guess is ¿ than epsilon

-value = (value + number/value) /2

-increments iteration value by 1 to keep track of iterations

E FUNCTION

-This function calculates value of e to a certain accuracy given by EPSILON, and also keeps track of iterations to reach said accuracy

-uses a for loop

-exit condition is when the absolute value of the previous guess for e - the current guess is ¿ than epsilon

-value = (value + 1/f)

-f set to f* loop index

-f starts at 1

-increments iteration value by 1 to keep track of iterations

PI FUNCTION (EULER)

-calculates PI to a certain accuracy

-for loop

-val = val + 1/loop index * loop index

MAKEFILE

-Compiles and formats all .c files

-compiles the test harness, and links it to the math library functions, allowing them to be used by the harness