

Assignment 2 Design Doc

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Details:

Writing and implementing \sin , \cos , \sin^{-1} (arcsin), \cos^{-1} (arccos), \tan^{-1} (arctan), and \log functions. The Taylor series will be used for \sin , \cos , and \arcsin . \arccos and \arctan can be calculated from \arcsin while implementing a square root function. As well as creating a `main()` program and acting as a test harness.

Pseudocode:

For $\sin(x)$

1. will have some placeholder variables (i, x, n , etc)
2. Creating a for loop that goes till EPSILON
 - a. Creating another loop for the factorial $(2n+1)!$
 - i. Adding the value for the factorial together (fact plus fact multiplied by i)
 - b. Coding (-1) to the power n times (x to the power $2n+1$)
 - c. Dividing (x^{2n}) by the factorial
 - d. Multiplying it all to $(-1)^n$

For $\cos(x)$

1. will have some placeholder variables (i, x, n , etc)
2. Creating a for loop that goes till EPSILON
 - e. Creating another loop for the factorial $(2n)!$

- i. Adding the value for the factorial together (fact times and add it i)
- f. Coding $(-1)^n$ times (x^{2n})
- g. Dividing (x^{2n}) by the factorial
- h. Multiplying it all to (-1) to the power of n

For $\arcsin(x)$

- 1. $Zn-1$ - (Using $\sin(zn)-x$)
- 2. Using $\cos(zn-1)$
- 3. Divide 1 and 2 by each other

For $\arccos(x)$

- 1. Get π from `math.h`
- 2. $\pi/2 - \arcsin(x)$

For $\arctan(x)$

- 1. Using (x)
- 2. Using square root fcn for x^2+1 given in piazza
- 3. Dividing $\arcsin(\text{step } 1 / 2)$

Main file

- 1. creating bool opt for options a,b,c, etc;
- 2. Creating switch opt
- 3. for every case

- a. set boolean: true
 - b. set pointer : corresponding mathlib.c function
4. Create a default case
 5. Return Int

Files

1. mathlib.h: Supplied file, with yhe function prototypes for the math functions
2. mathlib.c: This file contains my math function implementations, as prototyped in mathlib.h.
3. mathlib-test.c: This file will contain the main() program and acts as a test harness for my math library.
4. Makefile: This is a file that will allow the grader to type make to compile your program.
5. README.md: This file will describe how to build and run my program and list the command-line options it accepts and what they do.
6. DESIGN.pdf: Describe the purpose of your program and communicate the overall design of the program with enough detail
7. WRITEUP.pdf: Discussion of the results for my tests.

