Compute Sine using Taylor Series

Overview

This project stresses the use of floating point instructions to create a program that computes the sine of an angle given to you in degrees on the command line.

Taylor Series

The sine of an angle given in radians can be found using the Taylor Series:

```
sin x = x - x^3/3! + x^5/5! - x^7/7! ...
```

Notice each term flips from addition to subtraction.

Notice each term is based on the odd integers starting at 1.

Command line

You are to accept two arguments on the command line. `getopt` is not being used here to concentrate on the floating point math. Both arguments are therefore required.

- The angle in degrees whose sine you wish to calculate. Take this to be a double.
- The number of terms to evaluate. The number of terms must lie between 1 and 8 inclusive.

C version

To assist your efforts, here is a version of this project written in C.

Errors to stderr

Error messages must be sent to `stderr`.

If you are using the convergence macros to allow your program to build on both Apple Silicon Mac OS and Linux, note the special casing needed to deal with `stderr`. If this is you, compile the C version on Mac OS with the `-S` compiler option to see the generated assembly language and search for `stderr`.

Sample executions

```
SINE % ./a.out 0 8
The sine of 0.00 degrees is 0.000000 in radians.
SINE % ./a.out 90 8
The sine of 90.00 degrees is 1.000000 in radians.
SINE % ./a.out 180 8
The sine of 180.00 degrees is -0.000001 in radians.
```

```
SINE % ./a.out 180 82
Number of terms is out of range.
SINE % ./a.out 180 -10
Number of terms is out of range.
SINE % echo $?
1
```

CSC3510

The following applies to Carthage College CSC3510 students.

Work rules

Work is to be done solo.

What to hand in

Just the .S file. **Your name must be at the top of the file.**