2024 NCKU Program Design I HW9

Deadline: 2024/12/26

Problem

This assignment allows you to practice passing pointers to function into another function. Write a **complete program** to do the following:

- Assume there are functions declared as the followings:

  1. `double power(double, int)` that calculates x^n if we call `power(x, n)`
  2. `double multiply(double, int)` that calculate $x * n$ if we call `multiply(x, n)`
  3. `double divide(double, int)` that calculate x/n if we call `divide(x, n)`

  , where `x` must be **double** and `n` be **integer**.

Then,

- Write a function `double powerpower(…)` that can compute $(x^n)^m$, $(x * n)^m$, and $(x/n)^m$, where `powerpower()` must use **four parameters**: a pointer to function, one double and two integers.
- **Similarly**, write `double powermultiply(…)` that can compute $(x^n) * m$, $(x * n) * m$, and $(x/n) * m$.
- **Also**, write `double powerdivide(…)` that can compute $(x^n)/m$, $(x * n)/m$, and $(x/n)/m$.

Where, you additionally need to

- Use **typedef** to define a new type F which is a pointer to function (of the above functions: `power(x, n)`, `multiply(x, n)`, and `divide(x, n)`).
- When **executing** your program, you can choose the values for `x`, `n`, and `m` by using `argc` and `argv`.
- Write the documentation (of what your program does and the design details in your implementation).

Submission

> 請不要嘗試攻擊 Judge 系統，否則此堂課將不予以通過
>
> Don't attack judge system otherwise you will fail this course.
>
> 一旦發現作業抄襲或是請人代寫之情形，學期作業成績將 "全部" 以 0 分計算
>
> One instances of severe plagiarism, hiring someone to write assignments, or similar activities are detected, the semester's assignment scores will be calculated as 0 point across the board.

> You should hand in both homework to get the full score.
>
> If you submit your C code without the documentation after the deadline, you'll get 50 points; otherwise, you'll get 0 point in total.

Your C source code

Before you start

Make sure you can login the server by your personal account.

submission

- Server IP: `140.116.246.48` , Port: `2024`

  ```
  > ssh 學號@140.116.246.48 -p 2024
  ```

- Create an directory with name `HW9` in your home directory.
  - You can use the "pwd" command to confirm your current directory.
  - The "mkdir [name]" command can create a directory with the name [name]
- In `HW9` directory, you need to create a file with name `pA.c` .
- You can directly use the command `hw9` to check whether the result of the question is correct.

Documentation of your code

- Write the documentation of what your program does and the design details in your implementation.
- Please named as `學號_姓名_HW9.pdf` .
- Submit it to moodle.

I/O format for the judge

input

```
$ ./pA x n m
```

output

Output the "double" number in 7 lines.

```
result of (x^n)^m
result of (x*n)^m
result of (x/n)^m
result of (x^n)*m
result of (x*n)*m
result of (x/n)*m
result of (x^n)/m
result of (x*n)/m
result of (x/n)/m
```

Sample data

Example 1

Input:

```
$ ./pA 6.5 8 3
```

Output:

```
32353447101972729856.000000
140608.000000
0.536377
9559344.386719
156.000000
2.437500
1062149.376302
17.333333
0.270833
```

Example 2

Input:

```
$ ./pA 10.1 2 5
```

Output:

```
11046221254.112040
3363232.160320
3284.406407
510.050000
101.000000
25.250000
20.402000
4.040000
1.010000
```

Example 3

Input:

```
$ ./pA 30 5 3
```

Output:

```
14348907000000000557056.000000
3375000.000000
216.000000
72900000.000000
450.000000
18.000000
8100000.000000
50.000000
2.000000
```