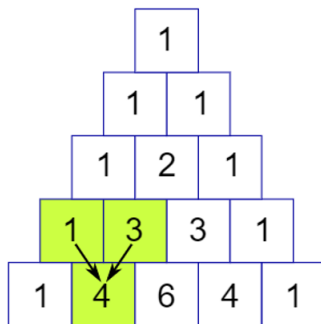


For, While, and Do-While in C

September 20, 2022

1. Write functions for Pascal's Triangle and Fibonacci Sequence

Pascal's Triangle



Level = 5

<https://www.mathsisfun.com>

Pascal's Triangle

- **Input:** an integer **n**, representing the number of levels of the Pascal's Triangle
- **Output:** print all the values at each level of the Pascal's Triangle with **n** levels

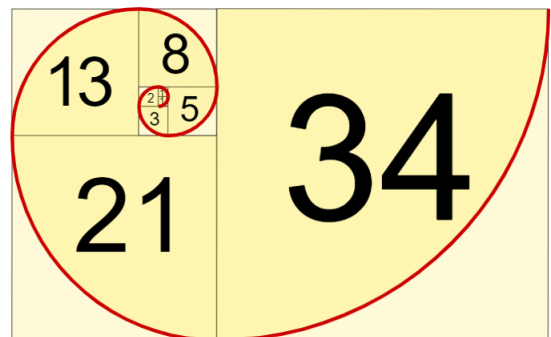
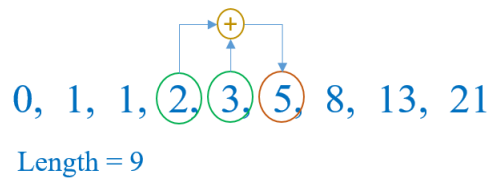
Fibonacci Sequence

- **Input:** an integer **n**, representing the length of the Fibonacci Sequence
- **Output:** print all **n** elements of the Fibonacci Sequence
- You should look up for the formula and definition of the Pascal's Triangle and Fibonacci Sequence before coding

Example:

```
1 // Pascal Triangle
2 Input: 5
3 Output:
4 1
5 1 1
```

Fibonacci Sequence



```

6 1 2 1
7 1 3 3 1
8 1 4 6 4 1
9
10 // Fibonacci Sequence
11 Input: 9
12 Output:
13 0 1 1 2 3 5 8 13 21

```

Code Listing 1: Test Case

2. Write 4 functions for the trigonometric functions below:

$$\sin(x) \approx \sum_{n=0}^{\infty} (-1)^n \frac{x^{(2n+1)}}{(2n+1)!} = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \frac{x^9}{9!} - \dots$$

$$\cos(x) \approx \sum_{n=0}^{\infty} (-1)^n \frac{x^{2n}}{(2n)!} = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} + \frac{x^8}{8!} - \frac{x^{10}}{10!} + \dots$$

$$\sinh(x) \approx \sum_{n=0}^{\infty} \frac{x^{(2n+1)}}{(2n+1)!} = x + \frac{x^3}{3!} + \frac{x^5}{5!} + \frac{x^7}{7!} + \frac{x^9}{9!} + \dots$$

$$\cosh(x) \approx \sum_{n=0}^{\infty} \frac{x^{2n}}{(2n)!} = 1 + \frac{x^2}{2!} + \frac{x^4}{4!} + \frac{x^6}{6!} + \frac{x^8}{8!} + \frac{x^{10}}{10!} + \dots$$

- **Input:** two integers **x** (variable) and **n** (exponent for approximation)
- **Output:** print the approximation of the trigonometric function with variable **x**. For example, $\cos(x=0)$ will have output = 1

NOTE: Please pay attention to these conditions

- x is radian
- n is a positive integer ≥ 0
- The first input **MUST** be **x** and the second input **MUST** be **n**
- You should code your own function for calculating the factorial

```

14 // sin(x)
15 Input: 3.14 10
16 Output: 0.0015926529267151343
17
18 // cos(x)
19 Input: 3.14 10
20 Output: -0.9999987316527259
21
22 // sinh(x)
23 Input: 3.14 10
24 Output: 11.53029203039954

```

```
25
26 // cosh(x)
27 Input: 3.14 10
28 Output: 11.573574828234543
```

Code Listing 2: Test Case

3. **Given a positive integer n , write a function to reverse the order of all the digits of n . Only use while (or for) and basic arithmetic operations like $+$, $-$, $*$, $/$, $\%$, $//$...**

- **Input:** a positive integer n
- **Output:** print the reversed n . For example, input: 12345678910, output: 1987654321

NOTE: Please pay attention to these conditions

- Do **NOT** convert n into array
- Only use while (or for) loop
- Eliminate 0 if there is any at the beginning of the reversed n

```
29 Input: 12345678910
30 Output: 1987654321
31
32 Input: 123456789
33 Output: 987654321
```

Code Listing 3: Test Case