

Hands-on Exercise-IV (Python)

1. Write a python program that takes the value of N through keyboard and prints a table of the power of 2 that are less than or equal to 2^N .

Enter a number

5

0	1
1	2
2	4
3	8
4	16
5	32

2. Write a python program that displays all the numbers from 100 to 1,000, ten per line, that are divisible by 5 and 6. Numbers are separated by exactly one space.
3. Write a python program to compute the sum of the first n terms ($n \geq 1$) of the series.

$$S = 1 - 3 + 5 - 7 + 9 - \dots$$

4. Input a number n , write a python program to compute n factorial (written as $n!$) where $n \geq 0$.
5. For a given x and a given n , write a python program to compute $x^n/n!$.
6. Write a python program to evaluate the function $\sin(x)$ as defined by the infinite series expansion.

$$\sin(x) = x - x^3/3! + x^5/5! - x^7/7! + \dots$$

The acceptable error for computation is 10^{-6} .

7. Write a python program to evaluate the function $\cos(x)$ as defined by the infinite series expansion.

$$\cos(x) = 1 - x^2/2! + x^4/4! - x^6/6! + \dots$$

The acceptable error for computation is 10^{-6} .

8. Assume that x is a positive variable of type double. Write a python code fragment that uses the Taylor series expansion to set the value of sum to $e^x = 1 + x + x^2/2! + x^3/3! + \dots$
9. Write a python program to generate and print the first n terms of the Fibonacci sequence where $n \geq 1$.

The first few terms are:

0, 1, 1, 2, 3, 5, 8, 13,

Each term beyond the first two is derived from the sum of its two nearest predecessors i.e. a new term in the series (Except the first two) is found by the following formula.

new term = preceding term + term before the preceding term

Let us define:

c as new term

b as the preceding term

a as the term before the preceding term

So, $c=b+a$

Your program should handle for all positive values of n .

Example: If $n=1$, it will display as: Fibonacci Series is: 0

If $n=2$, it will display as: Fibonacci Series is: 0, 1

If $n=3$, it will display as: Fibonacci Series is: 0, 1, 1

If $n=10$, it will display as: Fibonacci Series is: 0, 1, 1, 2, 3, 5, 8, 13, 21, 34

10. Write a python program to generate and print the first n terms of the Fibonacci numbers using an efficient algorithm. In this case, you need to find a pair of Fibonacci terms, in each iteration and display them and adjust the preceding term b and the term before the preceding term a . Your program should handle all positive values of n .

Example:

If $n=10$, it will display as: Fibonacci Series is: 0, 1, 1, 2, 3, 5, 8, 13, 21, 34

If $n=11$, it will display as: Fibonacci Series is: 0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55

11. Write a python program that accepts a positive integer n and reverses the order of its digits.
12. Write a python program to compute the square root of a number using Newton's method.
13. Write a python program that puts the binary representation of a positive integer N into a String s .
14. Write a python program that reads an integer and displays all its smallest factors in increasing order. For example, if the input integer is 120, the output should be as follows: 2, 2, 2, 3, 5.
15. Write a python program GCD that finds the greatest common divisor (gcd) of two integers using Euclid's algorithm, which is an iterative computation based on the following observation: if x is greater than y , then if y divides x , the gcd of x and y is y ; otherwise, the gcd of x and y is the same as the gcd of $x \% y$ and y .
16. Write a python program to check a number n is prime or not. The number to be inputted through keyboard.
17. Write a python program called PrimeCounter that takes a command line argument N and finds the number of primes less than or equal to N .
18. Write a python program to generate the first n terms of the sequence without using multiplication.
- 1 2 4 8 16 32

19. Write a python program to determine whether or not a number n is a factorial number.
20. For some integer n , write a python program to find the largest factorial number present as factor in n .
21. Given two numbers d and e are suspected of being consecutive members of the Fibonacci sequence. Write a python program that will refute or confirm this conjecture.
22. Write a python program that reads in a set of n single digits and converts them into a single decimal integer. For example, the program should convert the set of 5 digits $\{2, 7, 4, 9, 3\}$ to the integer 27493.
23. Input an integer n . Write a python program that will find the smallest exact divisor other than one.
24. Amicable numbers are pair of numbers each of whose divisors add to the other number.
Example: The smallest pair of amicable numbers is (220, 284). They are amicable because the proper divisors of 220 are 1, 2, 4, 5, 10, 11, 20, 22, 44, 55 and 110, of which the sum is 284; and the proper divisors of 284 are 1, 2, 4, 71 and 142, of which the sum is 220.

Note: 1 is included as a divisor but the numbers are not included as their own divisors.

Write a python program that tests whether a given pair of numbers is amicable numbers or not.

25. A perfect number is one whose divisors add up to the number.

Example: The first perfect number is 6. because 1, 2, and 3 are its proper divisors, and $1+2+3=6$

Write a python program that prints all perfect numbers in between 1 and 500.
