

ProgrammingAssignment4

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1 Programming Assignment 4

1. Write a Python Program to Find the Factorial of a Number?
2. Write a Python Program to Display the multiplication Table?
3. Write a Python Program to Print the Fibonacci sequence?
4. Write a Python Program to Check Armstrong Number?
5. Write a Python Program to Find Armstrong Number in an Interval?
6. Write a Python Program to Find the Sum of Natural Numbers?

1. Write a Python Program to find the factorial of a number.

```
[1]: #Get user input
a = int(input('Enter an integer: '))

factorial = 1

for i in range(1, a+1):
    factorial *= i

print(factorial)
```

Enter an integer: 5

120

2. Write a program to display the multiplication table.

Pseudo Code:

store 1 loop through and multiply by each number in the range --> escape that loop and update the stored variable and then re-enter the loop

```
[2]: for i in range(1,10):
      for j in range(1,10):
          print(i*j, end = ' ')
      print(end = '\n')
      i +=1
```

```

1 2 3 4 5 6 7 8 9
2 4 6 8 10 12 14 16 18
3 6 9 12 15 18 21 24 27
4 8 12 16 20 24 28 32 36
5 10 15 20 25 30 35 40 45
6 12 18 24 30 36 42 48 54
7 14 21 28 35 42 49 56 63
8 16 24 32 40 48 56 64 72
9 18 27 36 45 54 63 72 81

```

3. Write a program to print the Fibonnaci Sequence

$$F_n = F_{n-1} + F_{n-2}$$

where

$$F_0 = 1$$

and

$$F_1 = 1$$

psuedo code:

print the first 10 digits of the Fibonacci sequence

idea:

Start with hard code the first two terms

$$F_0 = 1, F_1 = 1, F_2 = 2$$

From here, we can generate the third term, so

create a variable to store the initial values and then allow them to

Explanation of the code:

line 0: create a function: line 1: create a llist that has the first two numbers in the sequence line 2: create a loop to go through the range of the third number (2) in the sequence of to n (user defined) line 3: use the append method and the formula to generate each new value of the sequence return the list of the elements of the sequence

```

[13]: def generate_fibonacci(n):
      fib = [1,1]
      for i in range(2, n):
          fib.append(fib[i-1] + fib[i-2])
      return fib

```

```
[14]: generate_fibonacci(10)
```

```
[14]: [1, 1, 2, 3, 5, 8, 13, 21, 34, 55]
```

4. Write a program to check an Armstrong number

An n -digit number, $a_1a_2a_3 \dots a_n$, is an Armstrong number is a number such that

$$a_1a_2a_3 \dots a_n = \sum_{i=1}^n a_i^n$$

It is the sum of its digits raised to the power of the number of its digits, for example:

153 has 3 digits and so if we take the sum of the digits to the power of 3, then the result is 153.

$$1^3 + 5^3 + 3^3 = 1 + 125 + 27 = 153$$

Explanation of the code: line 0: create a function line 1: get user input (note- do not wrap in int here or else you cannot iterate) line 2: check the length line 3: initialize sum_num line 4: create loop to loop through string line 5: take the sum of the individual digits raised to the power of the length of the number line 6: check to determine if the value in line 5 is equal to the user input as an integer

```
[17]: def armstrong_number():
      num = input('Enter an integer: ')
      length = len(a)
      sum_num = 0
      for digit in num:
          sum_num += int(digit)**length
      if sum_num == int(num):
          print(f'{num} is an Armstrong number')
      else:
          print(f'{num} is not an Armstrong number')
```

```
[18]: armstrong_number()
```

Enter an integer: 370

370 is an Armstrong number

2 #5. Write a Python Program to Find Armstrong Number in an Interval.

1. create a function that takes in the lower and upper bounds of the interval
2. Loop through the interval (by integer)

3. Store each number in the interval as a string so we can use the previous code

the reasoning is the same as the previous code after

```
[19]: def arm_int(start, end):  
    for num in range(start, end + 1):  
        num_str = str(num)  
        sum_num = 0  
        for digit in num_str:  
            sum_num += int(digit) ** len(num_str)  
        if sum_num == num:  
            print(num)
```

```
[5]: arm_int(100,1000)
```

153

370

371

407

3 #6 Write a Python Program to Find the Sum of Natural Numbers?

To find the sum of natural numbers

we can use the formula as such:

$$1 + 2 + 3 + \dots + n = \sum_{i=1}^n i = \frac{n(n+1)}{2}$$

```
[20]: def elementary_gauss(n):  
    sum = (n*(n+1))/2  
    return sum
```

```
[21]: elementary_gauss(100)
```

```
[21]: 5050.0
```

```
[ ]:
```

```
[ ]:
```