Day 9 of Python Assignment Answers -

25. Write a python program to display the multiplication table?

```python
def generate_multiplication_table(base: int, entries: int) -> None:
    """
    This function generates a multiplication table of the given base up
    to the given number of entries and prints it to the console.

    Args:
    - base: an integer, the base of the multiplication table
    - entries: an integer, the number of entries in the multiplication table

    Returns: None
    """
    for x in range(1, entries+1):
        print(f'{base} X {x} = {base*x}')

num = int(input('Enter the base of the multiplication table: '))
values = int(input('Enter the number of entries in the multiplication table: '))

generate_multiplication_table(num, values)
```

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This code defines a function called generate_multiplication_table that takes two arguments: base and entries.

Inside the function, it uses a for loop to iterate over a range of numbers from 1 to entries. For each number in the range, it multiplies it by base and prints the result in the format of a multiplication table using an f-string.

The f in front of the string tells Python to format the string with the values of the variables inside the braces. So {base} X {x} = {base*x} will get formatted with the values of base, x, and base*x for each iteration of the loop.

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26. Write a Python program to print Fibonacci sequence?

```python
def fibonacci_sequence(n: int) -> None:
    """
    This function prints the Fibonacci sequence up to the given number of terms.

    Args:
    - n: an integer, the number of terms in the Fibonacci sequence to print

    Returns: None
    """
    # initialize variables to hold the first two terms of the sequence
    a, b = 0, 1

    # print the first n terms of the sequence
    for i in range(n):
        print(a)
        a, b = b, a + b

# prompt the user to enter the number of terms in the sequence
n = int(input('Enter the number of terms in the Fibonacci sequence: '))

# call the fibonacci_sequence function to print the sequence
fibonacci_sequence(n)
```

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The Fibonacci sequence is a sequence of numbers in which each number is the sum of the two preceding ones, usually starting with 0 and 1. So the sequence goes: 0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, and so on.

In this program it will ask the user to input the number of terms they want to print in the Fibonacci sequence. Then, it will use a for loop to print the sequence up to the given number of terms.

The fibonacci_sequence function takes one argument, n, which represents the number of terms in the sequence to print. Inside the function, it initializes two variables a and b to hold the first two terms of the sequence, which are 0 and 1.

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It then uses a for loop to print the first n terms of the sequence. In each iteration of the loop, it first prints the value of a, which is the current term of the sequence. It then updates a and b to the next two terms of the sequence using the formula a, b = b, a + b.

This formula updates the value of a to the previous value of b, and updates the value of b to the sum of the previous values of a and b. This generates the next term in the sequence.

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27. Write a Python program to check armstrong number?

```python
def is_armstrong_number(n: int) -> bool:
    """
    This function checks whether the given number is an Armstrong number.

    Args:
    - n: an integer, the number to check

    Returns:
    - a boolean value indicating whether the number is an Armstrong number
    """
    # initialize variables
    sum = 0
    order = len(str(n))

    # calculate the sum of the cubes of the digits
    temp = n
    while temp > 0:
        digit = temp % 10
        sum += digit ** order
        temp //= 10

    # check if the sum is equal to the original number
    if n == sum:
        return True
    else:
        return False
```

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```python
# prompt the user to enter a number to check
n = int(input('Enter a number to check if it is an Armstrong number: '))

# call the is_armstrong_number function to check if the number is an Armstrong number
if is_armstrong_number(n):
    print(f'{n} is an Armstrong number')
else:
    print(f'{n} is not an Armstrong number')
```

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An Armstrong number is a number that is equal to the sum of its own digits raised to the power of the number of digits. For example, 153 is an Armstrong number because 1^3 + 5^3 + 3^3 = 1 + 125 + 27 = 153.

The is_armstrong_number function takes one argument, n, which represents the number to check. Inside the function, it initializes a variable sum to 0 and calculates the number of digits in n using the len function.

It then uses a while loop to calculate the sum of the cubes of the digits in n. In each iteration of the loop, it extracts the rightmost digit of n using the modulus operator %, raises it to the power of order (which is the number of digits in n), and adds it to the running sum. It then updates n by removing its rightmost digit using integer division //. This process continues until n becomes 0.

Finally, the function checks whether the sum of the cubes of the digits is equal to the original number n. If it is, the function returns True, indicating that n is an Armstrong number. Otherwise, it returns False.

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28. Write a Python program to find armstrong number in an interval?

```python
def find_armstrong_numbers(start, end):
    # loop through each number in the interval
    for num in range(start, end + 1):
        # calculate the number of digits in the current number
        order = len(str(num))
        # calculate the sum of the cubes of the digits in the current number
        sum = 0
        temp = num
        while temp > 0:
            digit = temp % 10
            sum += digit ** order
            temp //= 10
        # if the sum equals the original number, it is an Armstrong number
        if num == sum:
            print(num)

# example usage
find_armstrong_numbers(1, 1000)
```

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This program defines a function find_armstrong_numbers that takes two arguments: start and end, which represent the starting and ending values of the interval to search for Armstrong numbers.

The program then loops through each number in the interval using a for loop, and for each number, it calculates the sum of the cubes of its digits using the same algorithm as in the previous question.

If the sum equals the original number, it means the current number is an Armstrong number, so the program prints the number to the console.

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