DIRECTORATE OF INNOVATIVE LEARNING AND TEACHING (DILT)

Data Science and Gen AI LLMs

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Subject : Python Programming

Assignment

Question 1:

Number game between user and computer. The user starts by entering either 1 or 2 or 3 digits starting from 1 sequentially. The computer can return either 1 or 2 or 3 next digits in sequence, starting from the max number played by the user. User enters the next 1 or 2 or 3 next digits in sequence, starting from the max number played by the computer. Whoever reaches 20 first wins the game.

Note:

- the numbers should be in sequence starting from 1.

- minimum number user or computer should pick is at least 1 digit in sequence

- maximum number user or computer can pick only 3 digits in sequence

Program

```
import random

def play_game():
    max_number = 0
    print("Game Start! Whoever reaches 20 first wins.")
    while max_number < 20:
        player_input = input(f"Player: ").split()
        player_numbers = [int(num) for num in player_input]
        max_number = player_numbers[-1]
        if max_number >= 20:
            print("Player Wins!!!")
            break
        comp_play = random.randint(1, 3)  # Randomly choose 1 to 3 moves
        comp_play = min(comp_play, 20 - max_number)
```

```
        computer_numbers = list(range(max_number + 1, max_number + 1 + comp_play))
        max_number = computer_numbers[-1]
        print(f"Computer played: {computer_numbers}")
        if max_number >= 20:
            print("Computer Wins!")
            break
play_game()
```

Output

```
Game Start! Whoever reaches 20 first wins.
Player: 1 2
Computer played: [3, 4, 5]
Player: 6
Computer played: [7, 8]
Player: 9
Computer played: [10, 11, 12]
Player: 13 14
Computer played: [15, 16, 17]
Player: 18 19 20
Player Wins!!!

=== Code Execution Successful ===
```

Question 2:

Develop a function called ncr(n,r) which computes r-combinations of n-distinct object . use this function to print pascal triangle, where number of rows is the input

Program

```
def factorial(n):
    if n == 0 or n == 1:
        return 1
    result = 1
    for i in range(2, n + 1):
        result *= i
    return result
```

```
def ncr(n, r):
    if r > n or r < 0:
        return 0
    return factorial(n) // (factorial(r) * factorial(n - r))
def print_pascal_triangle(rows):
    for i in range(rows):
        print(" " * (rows - i), end="")
        for j in range(i + 1):
            print(ncr(i, j), end=" ")
        print()
num_rows = int(input("Enter the number of rows for Pascal's triangle: "))
if num_rows >= 0:
    print_pascal_triangle(num_rows)
else:
    print("Number of rows cannot be negative.")
```

Output

Enter the number of rows for Pascal's triangle: 8

```
Enter the number of rows for Pascal's triangle: 7
       1
      1 1
     1 2 1
    1 3 3 1
   1 4 6 4 1
  1 5 10 10 5 1
 1 6 15 20 15 6 1

=== Code Execution Successful ===
```

Question 3:

Read a list of n numbers during runtime. Write a Python program to print the repeated elements with frequency count in a list.

Program

```
numbers =
 list(map(int, input("Enter a list of numbers in the format [num1, num2, ...]: ").strip('[]').split(',')))
frequency = {}
for num in numbers:
    frequency[num] = frequency.get(num, 0) + 1
for num in frequency:
    print(f"Element {num} has come {frequency[num]} times")
```

Output

```
Enter a list of numbers in the format [num1, num2, ...]: [2,1,2,3,4,5,1
    ,3,6,2,3,4]
Element 2 has come 3 times
Element 1 has come 2 times
Element 3 has come 3 times
Element 4 has come 2 times
Element 5 has come 1 times
Element 6 has come 1 times

=== Code Execution Successful ===
```

Question 4:-

Develop a python code to read matric A of order 2X2 and Matrix B of order 2X2 from a file and perform the addition of Matrices A & B and Print the results.

Program

```
def read_matrix(file):
    with open(file, 'r') as f:
        matrix = [list(map(int, line.split())) for line in f.readlines()]
    return matrix
def add_matrices(A, B):
    return [[A[i][j] + B[i][j] for j in range(2)] for i in range(2)]
def print_matrix(matrix):
    for row in matrix:
        print(" ".join(map(str, row)))
```

```
if __name__ == "__main__":
    A = read_matrix('matrices.txt')[:2]  # Read first 2 lines for Matrix A
    B = read_matrix('matrices.txt')[2:]  # Read last 2 lines for Matrix B
    result = add_matrices(A, B)
    print("Result of A + B:")
    print_matrix(result)
```

Input :

Matrix – A

3 4

5 6

Matrix – B

7 8

9 10

Output

```
D:\JNTUH - DILT COURSE\Python- class notes and materials\Python class work materials\Assignment>python matrix_addition.p
y
Result of A + B:
10 12
14 16
```

Question 5:-

Write a program that overloads the + operator so that it can add two objects of the class Fraction. Fraction can be considered of the for P/Q where P is the numerator and Q is the denominator.

Program

```
class Fraction:
    def __init__(self, numerator, denominator):
        if denominator == 0:
            raise ValueError("Denominator cannot be zero.")
        self.numerator = numerator
        self.denominator = denominator
    def __add__(self, other):
        if not isinstance(other, Fraction):
```

```
            return NotImplemented
        new_numerator = (self.numerator * other.denominator) +
                                                    (other.numerator * self.denominator)
        new_denominator = self.denominator * other.denominator


        return Fraction(new_numerator, new_denominator)
    def __str__(self):
        return f"{self.numerator}/{self.denominator}"
frac1 = Fraction(4, 2)
frac2 = Fraction(5, 3)
result = frac1 + frac2
print(result)
```

Output