**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

```
import random

current_num = 0

print("Game starts!")

while current_num < 20:
    # Player's turn
    print("Your turn.")
    pick = int(input("How many numbers will you pick (1, 2, or 3)? "))

    while pick < 1 or pick > 3:
        print("Invalid! Pick 1, 2, or 3.")
        pick = int(input("How many numbers will you pick (1, 2, or 3)? "))


    picks = []
    for i in range(pick):
        if current_num < 20:
            current_num += 1
            picks.append(current_num)

    print("You pick:", " ".join(map(str, picks)))

    if current_num == 20:
        print("You win!")
        break


    print("computer's turn.")
    comp_pick = random.randint(1, 3)

    comp_picks = []
    for i in range(comp_pick):
        if current_num < 20:
            current_num += 1
            comp_picks.append(current_num)

    print("Computer picks:", " ".join(map(str, comp_picks)))

    if current_num == 20:
        print("Computer wins!")
        break
```

```
Game starts!
Your turn.
How many numbers will you pick (1, 2, or 3)? 3
You pick: 1 2 3
computer's turn.
Computer picks: 4 5 6
Your turn.
How many numbers will you pick (1, 2, or 3)? 5
Invalid! Pick 1, 2, or 3.
How many numbers will you pick (1, 2, or 3)? 2
You pick: 7 8
computer's turn.
Computer picks: 9 10
Your turn.
How many numbers will you pick (1, 2, or 3)? 3
You pick: 11 12 13
computer's turn.
Computer picks: 14 15 16
Your turn.
How many numbers will you pick (1, 2, or 3)? 1
You pick: 17
computer's turn.
Computer picks: 18
Your turn.
How many numbers will you pick (1, 2, or 3)? 3
You pick: 19 20
```

```
You win!
```

**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

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

def ncr(n, r):
    if r > n:
        return 0
    return factorial(n) // (factorial(r) * factorial(n - r))

def pascal_triangle(rows):
    for i in range(rows):
        for j in range(i + 1):
            print(ncr(i, j), end=' ')
        print()

num_rows = int(input("Enter number of rows: "))
pascal_triangle(num_rows)
```

```
Enter number of rows: 6
1
1 1
1 2 1
1 3 3 1
1 4 6 4 1
1 5 10 10 5 1
```

**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.

```
numbers = []

input_string = input("Enter the numbers: ")

number_list = input_string.split(",")
for num in number_list:
    numbers.append(int(num.strip()))


frequency = {}

for num in numbers:
    if num in frequency:
        frequency[num] += 1
    else:
        frequency[num] = 1

for num in frequency:
    print("Element", num, "has come", frequency[num], "times")
```

```
Enter the numbers: 10,12,1,4,4,5,10,6,4,6,12,0,8,6
Element 10 has come 2 times
Element 12 has come 2 times
Element 1 has come 1 times
Element 4 has come 3 times
Element 5 has come 1 times
Element 6 has come 3 times
Element 0 has come 1 times
Element 8 has come 1 times
```

**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.

```
def read_matrix(filename):
    matrix = []
    with open(filename, 'r') as f:
        for line in f:
            row = line.split()
            new_row = []
            for item in row:
                new_row.append(int(item))
            matrix.append(new_row)
    return matrix


def add_matrices(A, B):
    result = [[0, 0], [0, 0]]
    for i in range(2):
        for j in range(2):
            result[i][j] = A[i][j] + B[i][j]
    return result


matrix_A = read_matrix('matrix_A.txt')
matrix_B = read_matrix('matrix_B.txt')

matrix_sum = add_matrices(matrix_A, matrix_B)

print("Matrix A + Matrix B = ")
for row in matrix_sum:
    print(row)
```

```
Matrix A + Matrix B =
[6, 8]
[10, 12]
```

**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

```
class Fraction:

    def __init__(self, numerator, denominator):
        self.numerator = numerator
        self.denominator = denominator

    def __add__(self, other):
        # (P1/Q1) + (P2/Q2) = (P1*Q2 + P2*Q1) / (Q1*Q2)
        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}"

def get_fraction_input():
    numerator = int(input("Enter the numerator: "))
    denominator = int(input("Enter the denominator: "))
    return Fraction(numerator, denominator)

print("Enter the first fraction:")
fraction1 = get_fraction_input()

print("Enter the second fraction:")
fraction2 = get_fraction_input()

result = fraction1 + fraction2

print("sum: ",result)
```

```
Enter the first fraction:
Enter the numerator: 10
Enter the denominator: 5
Enter the second fraction:
Enter the numerator: 1
Enter the denominator: 2
sum:  25/10
```