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

Solution -

```
import random

def user_turn(current):

 while True:

       try:

          user_input = input(f"Enter 1, 2, or 3 sequential numbers starting from {current + 1}: ").strip().split()

          user_numbers = [int(num) for num in user_input]

          if len(user_numbers) < 1 or len(user_numbers) > 3:

             print("You can only enter 1, 2, or 3 numbers.")

             continue

          if user_numbers[0] != current + 1 or user_numbers != list(range(user_numbers[0], user_numbers[0] + len(user_numbers))):

             print("Numbers must be sequential and start from the next number.")

             continue

          return user_numbers[-1]  # Return the last number played by the user

       except ValueError:

          print("Invalid input. Enter numbers only.")

def computer_turn(current):

   computer_choice = random.randint(1, 3)

   computer_numbers = list(range(current + 1, current + computer_choice + 1))
```

```
    print("Computer plays: ",' '.join(map(str, computer_numbers)))
    return computer_numbers[-1]
def play_game():
    current_number = 0
    while current_number < 20:
        current_number = user_turn(current_number)
        if current_number >= 20:
            print("Congratulations! You reached 20 and won the game!")
            break
        current_number = computer_turn(current_number)
        if current_number >= 20:
            print("Computer reached 20. You lost the game.")
            break
play_game()
```

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

Solution:

```
import math
def ncr(n, r):
    return math.factorial(n) // (math.factorial(r) * math.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: "))
print_pascal_triangle(num_rows)
```

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.

Solution:

```
def find_repeated_elements(numbers):
    frequency = {}
    for num in numbers:
        if num in frequency:
            frequency[num] += 1
        else:
            frequency[num] = 1
    print("Repeated elements with frequency count:")
    for num, count in frequency.items():
        if count > 1:  # Only print if the element is repeated
            print(f"{num} occurs {count} times")
n = int(input("Enter the number of elements: "))
numbers = []

for _ in range(n):
    num = int(input(f"Enter number {_+1}: "))
    numbers.append(num)
find_repeated_elements(numbers)
```

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.

AddMatrices.txt:

Matrix A:

1 2

3 4

Matrix B:

5 6

7 8

Solution:

```
def read_matrices(filename):
    with open(filename, 'r') as file:
        lines = file.readlines()
    matrix_a = []
    matrix_b = []
    reading_matrix = None
    for line in lines:
        line = line.strip()
        if line == "Matrix A:":
            reading_matrix = matrix_a
        elif line == "Matrix B:":
            reading_matrix = matrix_b
        elif line:
            reading_matrix.append(list(map(int, line.split())))
            return matrix_a, matrix_b
def add_matrices(matrix_a, matrix_b):
    result_matrix = [[0, 0], [0, 0]]
    for i in range(2):
        for j in range(2):
            result_matrix[i][j] = matrix_a[i][j] + matrix_b[i][j]
    return result_matrix
def print_matrix(matrix, name="Result Matrix"):
    print(f"{name}:")
    for row in matrix:
```

```
        print(" ".join(map(str, row)))
    print()
def main():
    filename = " AddMatrices.txt"
    matrix_a, matrix_b = read_matrices(filename)
    print_matrix(matrix_a, "Matrix A")
    print_matrix(matrix_b, "Matrix B")
    result = add_matrices(matrix_a, matrix_b)
    print_matrix(result, "Matrix A + Matrix B")
main()
```

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

Solution:

```
from math import gcd
class Fraction:
    def __init__(self, numerator, denominator):
        self.numerator = numerator
        self.denominator = denominator
        self.simplify()
    def __add__(self, other):
        if isinstance(other, Fraction):
            new_numerator = self.numerator * other.denominator + other.numerator *
self.denominator
            new_denominator = self.denominator * other.denominator
            return Fraction(new_numerator, new_denominator)
        return NotImplemented
    def simplify(self):
        common_divisor = gcd(self.numerator, self.denominator)
```

```
        self.numerator //= common_divisor
        self.denominator //= common_divisor

    def __str__(self):
        return f"{self.numerator}/{self.denominator}"
if __name__ == "__main__":
    n1 = int(input("Enter numerator for the first fraction: "))
    d1 = int(input("Enter denominator for the first fraction: "))
    f1 = Fraction(n1, d1)

    n2 = int(input("Enter numerator for the second fraction: "))
    d2 = int(input("Enter denominator for the second fraction: "))
    f2 = Fraction(n2, d2)

    result = f1 + f2
    print("Result of addition:", result)
```