Queue:

Source Code:

```
public class Queue<E> {

    private Node<E> head;
    private Node<E> tail;
    private int size = 0;

    private static class Node<E>{
        E element;
        Node<E> next;

        public Node(E element){
            this.element = element;
            this.next = null;
        }
    }

    public void insert(E element){
        Node<E> newNode = new Node<>(element);
        if (isEmpty()) {
            head = newNode;
        } else {
            tail.next = newNode;
        }
        tail = newNode;
        size++;
    }

    public E remove(){
        if (isEmpty()) {
            System.out.println("Query is empty");
            return null;
        }
        E element = head.element;
        head = head.next;

        if (isEmpty()) {
            tail = null;
        }
        size--;
        return element;
    }

    public E peek(){
        if (isEmpty()) {
            System.out.println("Query is empty");
            return null;
        } else {
            return head.element;
        }
    }

    public boolean isEmpty(){
```

```
        return size == 0;
    }

    public int size(){
        return size;
    }

}
```

01)

Source Code:

```
import java.util.Scanner;

public class StringParser {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter string: ");
        String string = scanner.nextLine();
        stringParser(string);
    }

    private static void stringParser(String string){
        Queue<Character> newQueue = new Queue<>();
        for (int i = 0; i < string.length(); i++) {
            newQueue.insert(string.charAt(i));
        }
        for (int i = 0; i < string.length(); i++) {
            System.out.print(newQueue.remove());

        }
    }
}
```

Output:

```
Enter string: Hello
Hello
```

02)

Source Code:

```
import java.util.Scanner;

public class StringMerger {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter string 1: ");
        String str1 = scanner.next();
        System.out.print("Enter string 2: ");
        String str2 = scanner.next();
        String mergerdString = stringMerger(str1, str2);
        System.out.println("Merged string: " + mergerdString);
    }

    public static String stringMerger(String str1, String str2){
        Queue<String> newQueue =new Queue<>();
        newQueue.insert(str1);
        newQueue.insert(str2);
        return (newQueue.remove() + newQueue.remove());
    }
}
```

Output:

```
Enter string 1: Hello
Enter string 2: World
Merged string: HelloWorld
```

03)

Source Code:

```
import java.util.Scanner;

public class StringComparison {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter the string: ");
        String string = scanner.nextLine();
        Character output = stringComparison(string);
        System.out.println("Result: " + output);
    }

    private static Character stringComparison(String string){
        Queue<String> newQueue = new Queue<>();
        if (string.contains(":")) {
            String[] arrayOfStr = string.split(" : ");
```

```
            for (String str : arrayOfStr){
                newQueue.insert(str);
            }
            String string1 = newQueue.remove();
            String string2 = newQueue.remove();

            if (string1.length() > string2.length()) {
                return 'L';
            } else if (string1.length() < string1.length()) {
                return 'R';
            } else if (string1.length() == string1.length() &&
string1.equals(string2)) {
                return 'S';
            } else if (string1.length() == string1.length()) {
                return 'D';
            } else {
                return null;
            }
        } else {
            return 'N';
        }
    }
}
```

Output:

```
Enter the string: Sample Sample
Result: N
```

```
Enter the string: Short : Long
Result: L
```

```
Enter the string: Sample : Apples
Result: D
```

```
Enter the string: Sample : Sample
Result: S
```

04)

Source Code:

```
import java.util.Scanner;

public class NumberChanger {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter number: ");
        String number = scanner.next();
        String changedNumber = numberChanger(number);
        System.out.println(changedNumber);
    }

    private static String numberChanger(String number){
        Queue<String> newQueue = new Queue<>();
        int numberLen = number.length();
        int mid = numberLen/2;
        String[] arrayOfNumbers = new String[]{number.substring(mid),
number.substring(0, mid)};
        for (String num : arrayOfNumbers){
            newQueue.insert(num);
        }
        return (newQueue.remove() + newQueue.remove());
    }
}
```

Output:

```
Enter number: 123456
456123
```

05)

Source Code:

```
import java.util.Scanner;

public class VowelFinder {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter a string: ");
        String string = scanner.nextLine();
        System.out.print("Vowels: ");
        vowelFinder(string);
    }

    private static void vowelFinder(String string){
        Queue<Character> newQueue = new Queue<>();
        for (int i = 0; i < string.length(); i++) {
```

```
            char letter = string.charAt(i);
            switch (letter) {
                case 'A', 'U', 'O', 'I', 'E', 'a', 'e', 'i', 'o', 'u' ->
newQueue.insert(letter);
                default -> {
                    continue;
                }
            }
        }
        while (!newQueue.isEmpty()){
            System.out.print(newQueue.remove() + " ");
        }
    }
}
```

Output:

```
Enter a string: ALGORTHIMS
Vowels: A O I
```

06)

Source Code:

```
import java.util.Scanner;

public class NumberInterleave {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter number sequence: ");
        String numberSequence = scanner.nextLine();
        String changedNumber = numberInterleave(numberSequence);
        System.out.println(changedNumber);
    }

    private static String numberInterleave(String number){
        Queue<String> newQueue1 = new Queue<>();
        Queue<String> newQueue2 = new Queue<>();
        int count = 1;
        String[] arrayOfNumbers = number.split(" ");
        int numOfElements = arrayOfNumbers.length;
        int mid = numOfElements / 2;
        for (String num : arrayOfNumbers){
            if (count <= mid){
                newQueue1.insert(num);
                count++;
            } else if (count <= arrayOfNumbers.length){
                newQueue2.insert(num);
                count++;
            }
        }
        String interleavedNumber = "";
```

```
        for (int i = 0; i < mid; i++) {
            interleavedNumber += newQueue1.remove() + " " +
newQueue2.remove() + " ";
        }
        return interleavedNumber;
    }
}
```

Output:

```
Enter number sequence: 10 20 30 40 50 60 70 80 90 100
10 60 20 70 30 80 40 90 50 100
```

07)

Source Code:

```
import java.util.Scanner;

class Student{
    private int stdNo;
    private int mathsMarks;
    private int chemistryMarks;
    private int physicsMarks;
    private float totalMarks;
    private float avgMarks;

    public Student(int stdNo, int mathsMarks, int chemistryMarks, int
physicsMarks) {
        this.stdNo = stdNo;
        this.mathsMarks = mathsMarks;
        this.chemistryMarks = chemistryMarks;
        this.physicsMarks = physicsMarks;
        this.totalMarks = mathsMarks + chemistryMarks + physicsMarks;
        this.avgMarks = totalMarks / 3;
    }

    public int getStdNo() {
        return stdNo;
    }

    public void setStdNo(int stdNo) {
        this.stdNo = stdNo;
    }

    public int getMathsMarks() {
        return mathsMarks;
    }

    public void setMathsMarks(int mathsMarks) {
        this.mathsMarks = mathsMarks;
    }
```

```
    public int getChemistryMarks() {
        return chemistryMarks;
    }

    public void setChemistryMarks(int chemistryMarks) {
        this.chemistryMarks = chemistryMarks;
    }

    public int getPhysicsMarks() {
        return physicsMarks;
    }

    public void setPhysicsMarks(int physicsMarks) {
        this.physicsMarks = physicsMarks;
    }

    public float getTotalMarks() {
        return totalMarks;
    }

    public void setTotalMarks(float totalMarks) {
        this.totalMarks = totalMarks;
    }

    public float getAvgMarks() {
        return avgMarks;
    }

    public void setAvgMarks(float avgMarks) {
        this.avgMarks = avgMarks;
    }
}

public class MarksCalculator {
    public static void main(String[] args) {
        Queue<Student> studentQueue = new Queue<>();
        Scanner scanner = new Scanner(System.in);
        System.out.print("How much student do you want to add to database:
");
        int noOfStudents = scanner.nextInt();
        System.out.println();

        for (int i = 0; i < noOfStudents; i++) {
            System.out.print("Enter the Student No: ");
            int stdNo = scanner.nextInt();
            System.out.print("Enter the Maths Marks: ");
            int mathsMarks = scanner.nextInt();
            System.out.print("Enter the Chemistry Marks: ");
            int chemistryMarks = scanner.nextInt();
            System.out.print("Enter the Physics Marks: ");
            int physicsMarks = scanner.nextInt();
            System.out.println();

            studentQueue.insert(new Student(stdNo, mathsMarks,
chemistryMarks, physicsMarks));
        }
```

```
        while (!studentQueue.isEmpty()){
            Student student = studentQueue.remove();
            System.out.println("Average mark of student number " +
student.getStdNo() + " is " + student.getAvgMarks());
        }
    }



}
```

Output:

```
How much student do you want to add to database: 3

Enter the Student No: 1
Enter the Maths Marks: 10
Enter the Chemistry Marks: 20
Enter the Physics Marks: 30

Enter the Student No: 2
Enter the Maths Marks: 40
Enter the Chemistry Marks: 50
Enter the Physics Marks: 60

Enter the Student No: 3
Enter the Maths Marks: 70
Enter the Chemistry Marks: 80
Enter the Physics Marks: 90

Average mark of student number 1 is 20.0
Average mark of student number 2 is 50.0
Average mark of student number 3 is 80.0
```