

# Queue

## - Queue using Array

```
//queue using array
public class QueueB {
    static class Queue {
        static int arr[];
        static int size;
        static int rear;

        Queue(int size) {
            this.size = size;
            arr = new int[size];
            rear = -1;
        }

        public static boolean isEmpty() {
            return rear == -1;
        }

        public static boolean isFull() {
            return rear == size-1;
        }

        public static void add(int data) {
            if(isFull()) {
                System.out.println("Overflow");
                return;
            }

            arr[++rear] = data;
        }

        //O(n)
        public static int remove() {
            if(isEmpty()) {
                System.out.println("empty queue");
                return -1;
            }

            int front = arr[0];
            for(int i=0; i<rear; i++) {
                arr[i] = arr[i+1];
            }
        }
    }
}
```

```

        }

        rear--;
        return front;
    }

    public static int peek() {
        if(isEmpty()) {
            System.out.println("empty queue");
            return -1;
        }

        return arr[0];
    }
}

public static void main(String args[]) {
    Queue q = new Queue(5);
    q.add(1);
    q.add(2);
    q.add(3);
    System.out.println(q.remove());
    System.out.println(q.peek());
}
}

```

### Circular queue using array

```

//circular queue using array
public class QueueB {
    static class Queue {
        static int arr[];
        static int size;
        static int front = -1;
        static int rear = -1;

        Queue(int size) {
            this.size = size;
            arr = new int[size];
        }

        public static boolean isEmpty() {
            return rear == -1 && front == -1;
        }
    }
}

```

```
public static boolean isFull() {
    return (rear+1)%size == front;
}

public static void add(int data) {
    if(isFull()) {
        System.out.println("Overflow");
        return;
    }
    //if it's the 1st element
    if(front == -1) {
        front = 0;
    }

    rear = (rear + 1)%size;
    arr[rear] = data;
}

public static int remove() {
    if(isEmpty()) {
        System.out.println("empty queue");
        return -1;
    }
    int res = arr[front];

    //if only 1 element is present
    if(front == rear) {
        front = rear = -1;
    } else {
        front = (front+1)%size;
    }

    return res;
}

public static int peek() {
    if(isEmpty()) {
        System.out.println("empty queue");
        return -1;
    }
}
```

```

        return arr[front];
    }
}

public static void main(String args[]) {
    Queue q = new Queue(5);
    q.add(1);
    q.add(2);
    q.add(3);
    q.add(4);
    q.add(5);
    System.out.println(q.remove());
    q.add(6);
    System.out.println(q.remove());
    q.add(7);

    while(!q.isEmpty()) {
        System.out.println(q.remove());
    }
}
}

```

#### - Queue using Linked List

```

//queue using Linked List
public class QueueB {
    static class Node {
        int data;
        Node next;
        Node(int data) {
            this.data = data;
            next = null;
        }
    }

    static class Queue {
        static Node head = null;
        static Node tail = null;

        public static boolean isEmpty() {
            return head == null && tail == null;
        }
    }
}

```

```

    public static void add(int data) {
        Node newNode = new Node(data);
        if(isEmpty()) {
            tail = head = newNode;
        } else {
            tail.next = newNode;
            tail = newNode;
        }
    }

    public static int remove() {
        if(isEmpty()) {
            System.out.println("empty queue");
            return -1;
        }
        int front = head.data;
        //single node
        if(head == tail) {
            tail = null;
        }
        head = head.next;
        return front;
    }

    public static int peek() {
        if(isEmpty()) {
            System.out.println("empty queue");
            return -1;
        }

        return head.data;
    }
}

public static void main(String args[]) {
    Queue q = new Queue();
    q.add(1);
    q.add(2);
    q.add(3);
    q.add(4);
    q.add(5);
}

```

```

        while(!q.isEmpty()) {
            System.out.println(q.peek());
            q.remove();
        }
    }
}

```

## - Java Collection Framework

```

//queue using Java Collection Framework
import java.util.*;

public class QueueB {

    public static void main(String args[]) {

        //Queue<Integer> q = new LinkedList();

        Queue<Integer> q = new ArrayDeque();

        q.add(1);

        q.add(2);

        q.add(3);

        q.add(4);

        q.add(5);

        while(!q.isEmpty()) {

            System.out.println(q.peek());

            q.remove();

        }

    }

}

```

## - Queue using 2 stacks

```

//queue using 2 stacks
import java.util.*;

public class QueueB {

    static class Queue {

```

```

static Stack<Integer> s1 = new Stack<>();
static Stack<Integer> s2 = new Stack<>();

public static boolean isEmpty() {
    return s1.isEmpty();
}

public static void add(int data) {
    while(!s1.isEmpty()) {
        s2.push(s1.pop());
    }
    s1.push(data);
    while(!s2.isEmpty()) {
        s1.push(s2.pop());
    }
}

public static int remove() {
    return s1.pop();
}

public static int peek() {
    return s1.peek();
}
}

public static void main(String args[]) {
    Queue q = new Queue();
    q.add(1);
    q.add(2);
    q.add(3);

    while(!q.isEmpty()) {
        System.out.println(q.peek());
        q.remove();
    }
}
}

```