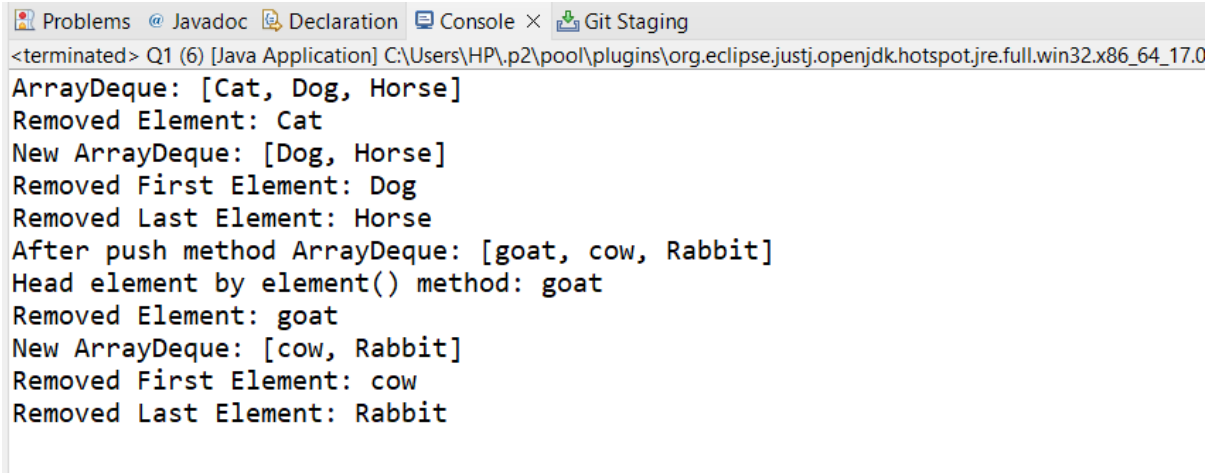
1.Implement an ArrayDequeue and all of its methods such as add(), addFirst(), addLast(), element(), poll(), push(), remove.

CODE:

```
package sba3;
import java.util.ArrayDeque;
public class Q1 {
	public static void main(String[] args) {
		ArrayDeque<String> animals = new ArrayDeque<>();
// Using add()
		animals.add("Dog");
// Using addFirst()
		animals.addFirst("Cat");
// Using addLast()
		animals.addLast("Horse");
		System.out.println("ArrayDeque: " + animals);
// Using poll()
		String element = animals.poll();
		System.out.println("Removed Element: " + element);
		System.out.println("New ArrayDeque: " + animals);
// Using pollFirst()
		String firstElement = animals.pollFirst();
		System.out.println("Removed First Element: " +
firstElement);
// Using pollLast()
		String lastElement = animals.pollLast();
		System.out.println("Removed Last Element: " +
lastElement);
// using push()
		animals.push("Rabbit");
		animals.push("cow");
		animals.push("goat");
		System.out.println("After push method ArrayDeque: " +
animals);
// using element()--returns element present in the head
		System.out.println("Head element by element() method: " +
				animals.element());
// Using remove()
		String element1 = animals.remove();
		System.out.println("Removed Element: " + element1);
		System.out.println("New ArrayDeque: " + animals);
// Using removeFirst()
		String firstElement1 = animals.removeFirst();
		System.out.println("Removed First Element: " +
firstElement1);
// Using removeLast()
		String lastElement1 = animals.removeLast();
```

```
            System.out.println("Removed Last Element: " +
lastElement1);
 }
}
```

OUTPUT:



2.Implement a PriorityQueue and use all the methods.

CODE:

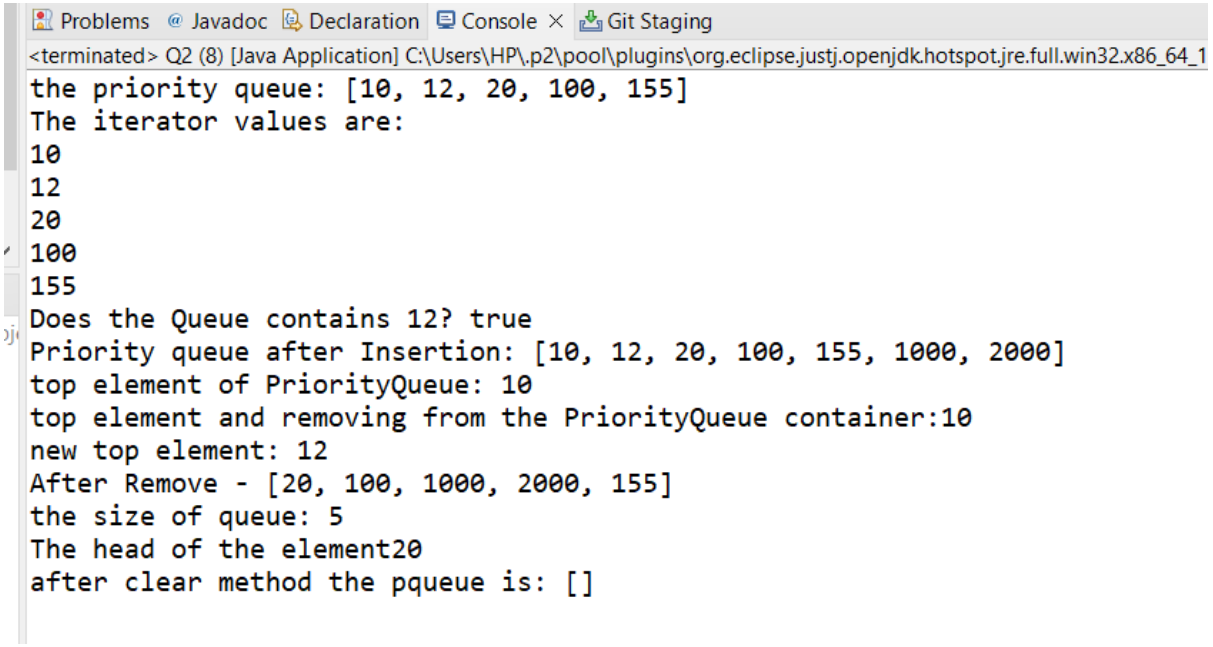
```
package sba3;
import java.util.Iterator;
import java.util.PriorityQueue;
public class Q2 {
public static void main(String[] args) {
// Creating empty priority queue
PriorityQueue<Integer> pQueue = new PriorityQueue<Integer>();
// Adding items to the pQueue using add()
pQueue.add(10);
pQueue.add(12);
pQueue.add(20);
pQueue.add(100);
pQueue.add(155);
System.out.println("the priority queue: " + pQueue);
// Creating an iterator
 Iterator <Integer>value =pQueue.iterator();

 // Displaying the values after iterating through the queue
 System.out.println("The iterator values are: ");
 while (value.hasNext()) {
 System.out.println(value.next());
 }
```

```
 // Check for "4" in the queue
 System.out.println("Does the Queue contains 12?
"+pQueue.contains(12));
 // Inserting using offer()
 pQueue.offer(1000);
 pQueue.offer(2000);
 // Displaying th final Queue
 System.out.println("Priority queue after Insertion: " +pQueue );
// Printing the top element of PriorityQueue
System.out.println("top element of PriorityQueue: " +
pQueue.peek());
// Printing the top element and removing it
// from the PriorityQueue container
System.out.println("top element and removing from the PriorityQueue
container:" + pQueue.poll());
// Printing the top element again
System.out.println("new top element: " + pQueue.peek());
// using the method
pQueue.remove(12);
System.out.println("After Remove - " + pQueue);
//to find size
System.out.println("the size of queue: "+pQueue.size());
//element()
System.out.println("The head of the element"+pQueue.element());
// Creating an iterator

//clear()
pQueue.clear();
System.out.println("after clear method the pqueue is: "+pQueue);
}
}
```

OUTPUT:



3.Implement a Stack and all of its methods peek(), push(), pop(), and to determine the size of the stack.

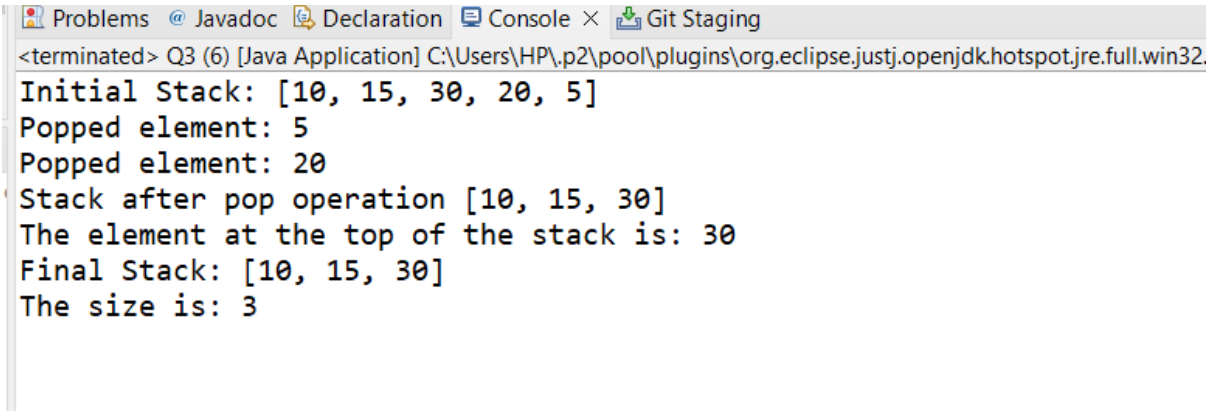
CODE:

```
package sba3;
import java.util.Stack;
public class Q3 {
public static void main(String[] args) {
// Creating an empty Stack
 Stack<Integer> stk = new Stack<Integer>();
 // Use add() method to add elements
 stk.push(10);
 stk.push(15);
 stk.push(30);
 stk.push(20);
 stk.push(5);
 // Displaying the Stack
 System.out.println("Initial Stack: " + stk);
 // Removing elements using pop() method
 System.out.println("Popped element: "
 + stk.pop());
 System.out.println("Popped element: "
 + stk.pop());
 // Displaying the Stack after pop operation
 System.out.println("Stack after pop operation "
 + stk);
 // Fetching the element at the head of the Stack
```

```
 System.out.println("The element at the top of the"
 + " stack is: " + stk.peek());

 // Displaying the Stack after the Operation
 System.out.println("Final Stack: " + stk);
 // Displaying the size of stack
 System.out.println("The size is: " + stk.size());
}
}
```

OUTPUT:



4.Write a program to implement insertion sort.

CODE:

```
package sba3;

public class Q4 {

public static void main(String[] args) {
		int a[]= {50,28,62,33,45};
		int temp,j;
		for(int i=1;i<a.length;i++)
		{
			temp=a[i];
			j=i;
			while(j>0 && a[j-1]>temp)
			{
				a[j]=a[j-1];
				j=j-1;
			}
			a[j]=temp;
			for(int k=0;k<a.length;++k)
			{
				System.out.print(a[k]+" ");
			}
			System.out.println();
		}
```

```
            for(int i=0;i<a.length;i++)
            {
                  System.out.print(a[i]+" ");
            }

      }

}
```

OUTPUT: