Write a java program to create a generic class stack which holds 5 integer and 5 double values

```
class GenericStack <T> {
        private Object[] stackArray;
        private int top =-1;
        private static final int N=5;

        public GenericStack ()
        {
              stackArray = new object[N];
        }

        public void push(T value)
        {
              if (top <N-1)
                  stackArray[++top] = value
              else
                  System.out.println ("Stack is full");
        }
        public T pop()
        {
              if (top >=0)
                  return (T) stackArray[top--];
              else
              {
                  System.out.println ("Stack is empty");
                  return null;
              }
        }
        public boolean isEmpty ()
        {     return top ==-1; }
        public boolean isFull()
        {     return top ==N-1; }
}
```

```
class main
{
    public static void main (String args [])
    {
      GenericStack< Integer> integerstack =new GenericStack<>();
      GenericStack<Double> doubleStack = new GenericStack<>();

      for (int i = 1; i<=5; i++){
            integerStack.push(i);
      }
      for (double i=1.0; i<=5.0; i++){
            doubleStack.push(i);
      }

      System.out.println(" Popped integers from the stack:");
      while (! integerStack.isEmpty ()){
            System.out.println(integerStack.pop());
      }

      System.out.println(" Popped double from the stack:");
      while (!doubl.isEmpty ()){
            System.out.println(* doubleStack.pop() );
      }
    }
}
```

} Output

```
Popped integers from the stack:
5
4
3
2
1
```

Popped doubles from the stack:

```
5.0
40
3.0
2.0
1.0
```

String

Demonstrate string length, string literal, string concat

```
public class string1{
    public static void main(String args[])
    {
      System.out.println("Demonstrating string length:")
      String a = "Hello";
      System.out.println(a.length());

      System.out.println("Str concat.");
      ~~String txt = "Age"~~
      String age = "9";
      String msg = "He is "+ age +" years old.";
      System.out.println(msg);

      System.out.println("Demonstrate literals");
      System.out.println("abc".length());
    }
}
```

Output:

```
Demonstrating string length:
 5
Str concat:
He is 9 years old
Demonstrate literals
 3
```

Use getchars () to extract Bmsce from "Welcome to Bmsce college"

```
public class string2 {
        public static void main (String args [ ]) {
             String s = "Welcome to BMSCE college";
             int start =10;
             int end = 16;
                char buf [] = new char [end -start];
             s.getChars (start, end, buf, 0);
             System.out.println (buf);
}
}
```

Output

```
BMSCE
```

Write a Java program to create an abstract class Shape with abstract methods calculateArea() and calculatePerimeter. Create subclasses Circle and Triangle that extend the Shape class.

```
import java.lang.Math;

abstract class Shape{
        double a;
        double b;
        double c;

        abstract void calculateArea();
        abstract void calculatePerimeter();
}

class Triangle extends Shape{
    Triangle(double x, double y, double z)
    {
        a=x;
        b=y;
        c=z;
    }

    void calculateArea()
    {
        double s = (a +b + c)/2;
        System.out.println("Area ="+(Math.sqrt (s * (s-a) *
                                    (s-b) * (s- c)));
    }
    void    calculatePerimeter()
    {
        System.out.println("Perimeter =" + (a+b+c));
    }
}
```

```
class Circle extends Shape{
    Circle (double r)
    {
        a=r;
    }
    void calculateArea ()
    {
        System.out.println("Area =" + (Math.PI * a * a));
    }
    void calculatePerimeter()
    {
        System.out.println(" Perimeter = " + (2 * Math.PI * a));
    }
}

class ShapeM{
    public static void main(String [] args)
    {
        Triangle t = new Triangle (3.0,3.0, 5.0);
        Circle c = new Circle(5.0);
        t.calculateArea ();
        t.calculatePerimeter();
        c.calculateArea();
        c.calculatePerimeter();
    }
}
```

Output:

```
Area = 4.14578098794425
Perimeter = 11.0
Area = 78.53981633974483
Perimeter = 31.41592653589793
```

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