**1 Write a program to add and multiply complex no?**

```
import java.util.Scanner;
class Complex
{
	 float real;
	 float img;
	Complex()
	{
		real = 0;
		img = 0;
	}
	Complex(float r, float i )
	{
		real = r;
		img = i;
	}
	Complex get_input(Complex a)
	{
		Scanner input = new Scanner(System.in);
		Complex n= new Complex();
		System.out.println("Enter the real no. : ");
		real = input.nextFloat();
		System.out.println("Enter the img no. : ");
		img = input.nextFloat();
		return (n);
	}
	void display()
	{
		System.out.println("\n\tThe number is "+real +"+i"+img);
	}
	Complex mult( Complex c1,Complex c2)
	{
		Complex c3 = new Complex();
		c3.real = c1.real*c2.real-c1.img*c2.img;
		c3.img = c1.img*c2.real + c1.real*c2.img;
		return (c3);
	}
	Complex add( Complex c1,Complex c2)
	{
		Complex c3 = new Complex();
		c3.real = c1.real+c2.real;
		c3.img = c1.img+c2.img;
		return (c3);
	}
```

```
        public static void main(String []args)
        {   Complex n1 = new Complex();
                Complex n2= new Complex();
                Complex n3= new Complex();
                n1.get_input(n1);
                n2.get_input(n2);
                n1.display();
                n2.display();
                System.out.println("\n\tAddition ");
                n3 = n3.add(n1, n2);
         n3.display();
                System.out.println("\n\tMultiplication ");
                n3 = n3.mult(n1, n2);
         n3.display();}}
```

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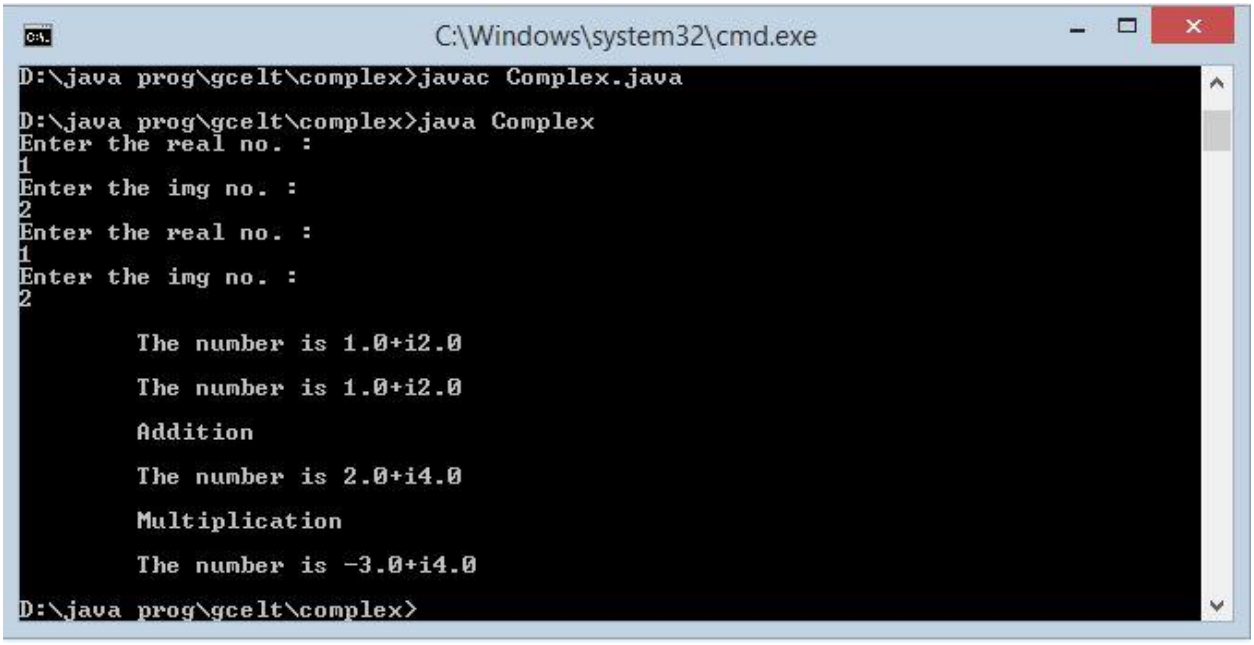


**2 write a program to show current date?**

```
import java.util.Date;

public class Time {
  public static void main(String args[]) {
     // Instantiate a Date object
     Date date = new Date();

     // display time and date using toString()
     System.out.println(date.toString());}}
```

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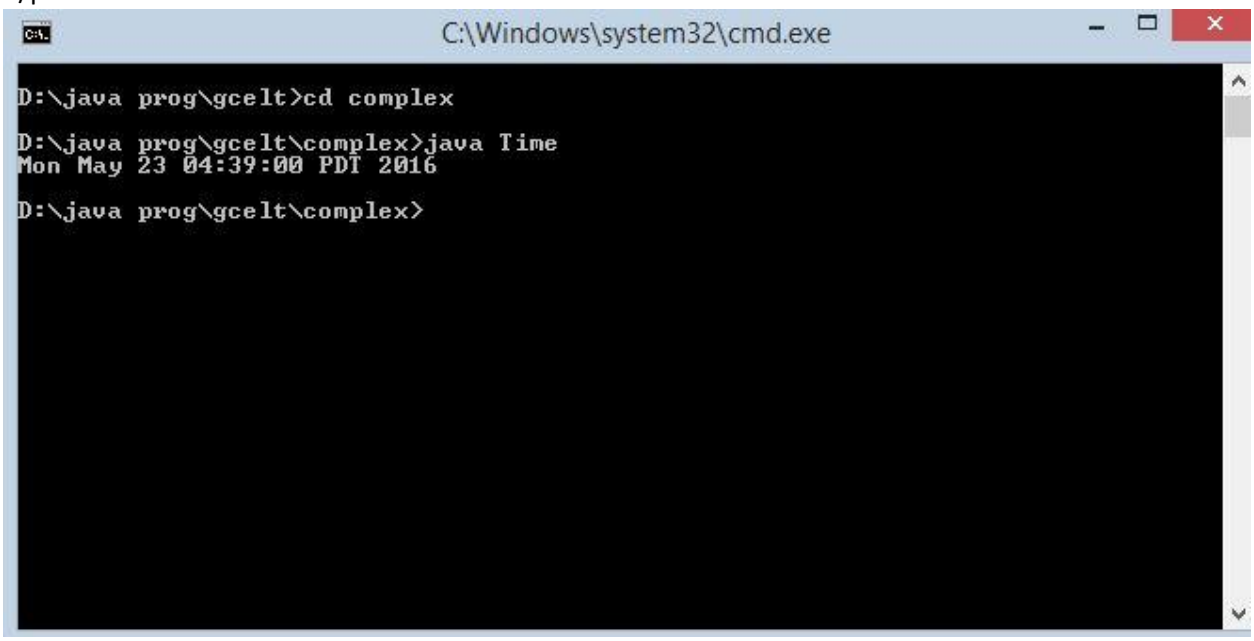
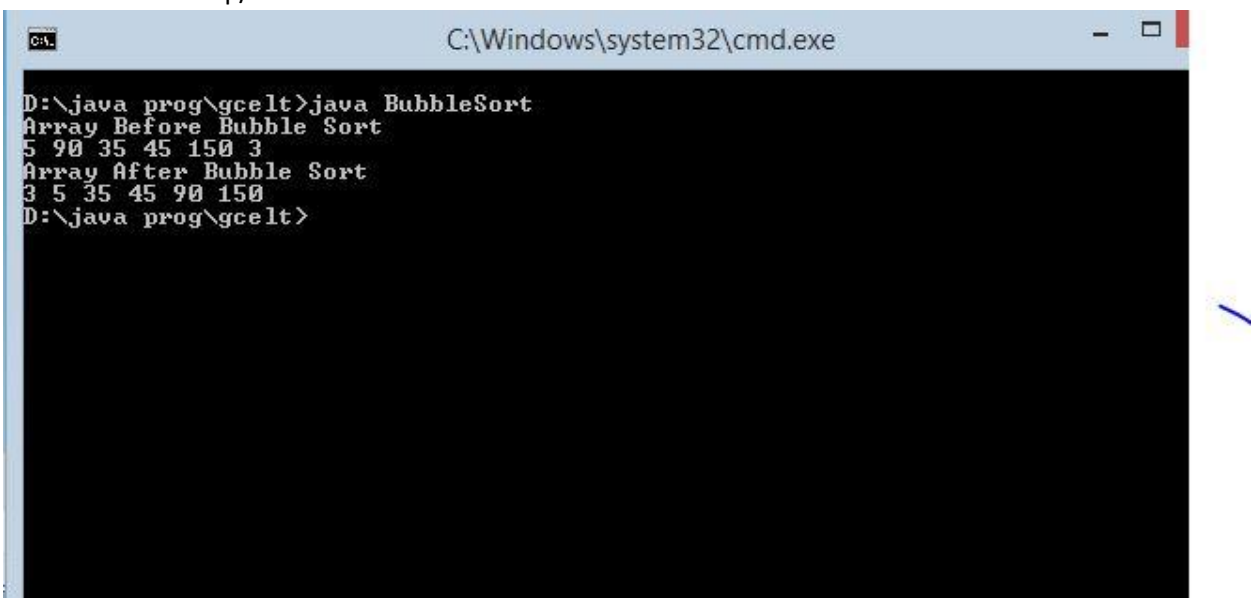



**3 write a program to bubble sort implementation?**

```
public class BubbleSort {

    public static void main(String[] args) {


        int intArray[] = new int[]{5,90,35,45,150,3};


        System.out.println("Array Before Bubble Sort");
        for(int i=0; i < intArray.length; i++){
            System.out.print(intArray[i] + " ");
        }


        bubbleSort(intArray);

        System.out.println("");


        System.out.println("Array After Bubble Sort");
        for(int i=0; i < intArray.length; i++){
            System.out.print(intArray[i] + " ");
        }
```

```
    }

    private static void bubbleSort(int[] intArray) {


        int n = intArray.length;
        int temp = 0;

        for(int i=0; i < n; i++){
            for(int j=1; j < (n-i); j++){

                if(intArray[j-1] > intArray[j]){
                    temp = intArray[j-1];
                    intArray[j-1] = intArray[j];
                    intArray[j] = temp;}}}}}}
                op/=
```

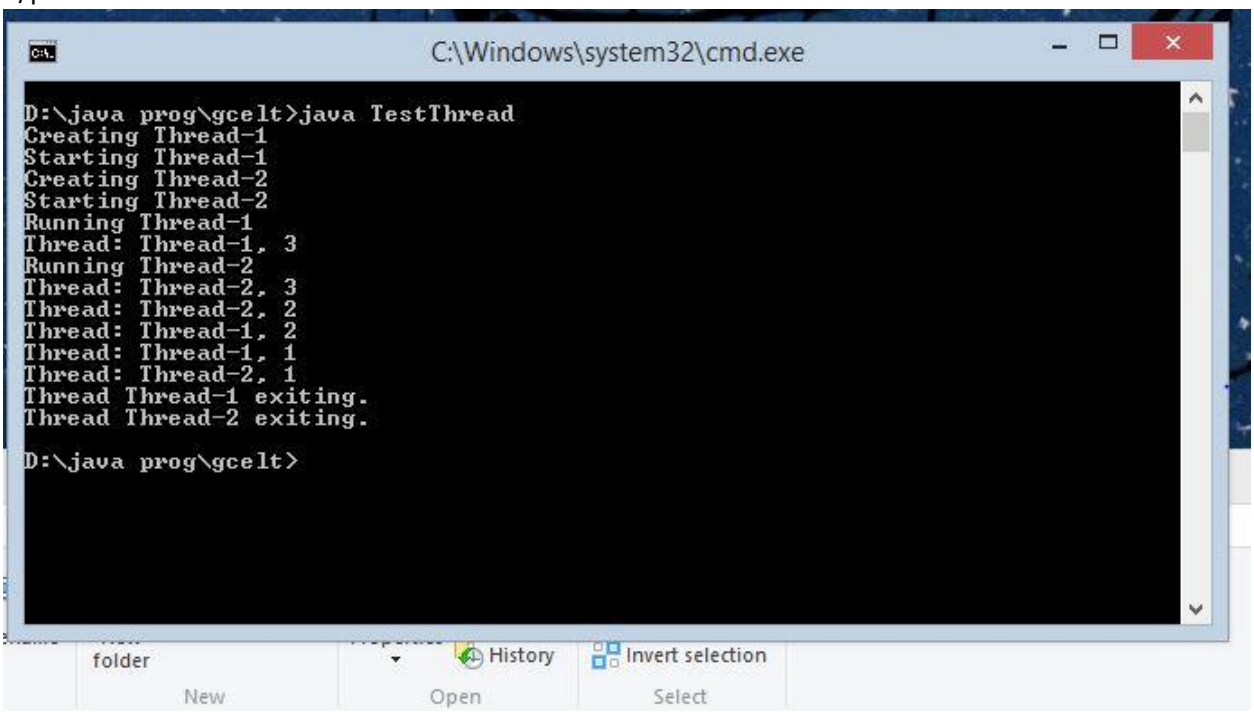



**4 write a program to implement 3 thread?**

```
class RunnableDemo implements Runnable {
  private Thread t;
  private String threadName;

  RunnableDemo( String name){
     threadName = name;
     System.out.println("Creating " +  threadName );
  }
  public void run() {
    System.out.println("Running " +  threadName );
    try {
```

```
      for(int i = 3; i > 0; i--) {
        System.out.println("Thread: " + threadName + ", " + i);
        // Let the thread sleep for a while.
        Thread.sleep(50);
      }
    } catch (InterruptedException e) {
      System.out.println("Thread " +  threadName + " interrupted.");
    }
    System.out.println("Thread " +  threadName + " exiting.");
  }

  public void start ()
  {
    System.out.println("Starting " +  threadName );
    if (t == null)
    {
      t = new Thread (this, threadName);
      t.start ();
    }
  }

}

public class TestThread {
  public static void main(String args[]) {

    RunnableDemo R1 = new RunnableDemo( "Thread-1");
    R1.start();

    RunnableDemo R2 = new RunnableDemo( "Thread-2");
    R2.start();}}
```

o/p=




**5 write a program to multiply two matrix?**

```
 import java.util.Scanner;

class MatrixMultiplication
{
  public static void main(String args[])
  {
    int m, n, p, q, sum = 0, c, d, k;

    Scanner in = new Scanner(System.in);
    System.out.println("Enter the number of rows and columns of first matrix");
    m = in.nextInt();
    n = in.nextInt();

    int first[][] = new int[m][n];

    System.out.println("Enter the elements of first matrix");

    for ( c = 0 ; c < m ; c++ )
      for ( d = 0 ; d < n ; d++ )
        first[c][d] = in.nextInt();

    System.out.println("Enter the number of rows and columns of second matrix");
    p = in.nextInt();
```

```
q = in.nextInt();

if ( n != p )
  System.out.println("Matrices with entered orders can't be multiplied with each other.");
else
{
  int second[][] = new int[p][q];
  int multiply[][] = new int[m][q];

  System.out.println("Enter the elements of second matrix");

  for ( c = 0 ; c < p ; c++ )
    for ( d = 0 ; d < q ; d++ )
      second[c][d] = in.nextInt();

  for ( c = 0 ; c < m ; c++ )
  {
    for ( d = 0 ; d < q ; d++ )
    {
      for ( k = 0 ; k < p ; k++ )
      {
        sum = sum + first[c][k]*second[k][d];
      }

      multiply[c][d] = sum;
      sum = 0;
    }
  }

  System.out.println("Product of entered matrices:-");

  for ( c = 0 ; c < m ; c++ )
  {
    for ( d = 0 ; d < q ; d++ )
      System.out.print(multiply[c][d]+"\t");

    System.out.print("\n");  }  } } }
```

o/p=

```
C:\Windows\system32\cmd.exe

D:\java prog\gcelt>cd mat mul

D:\java prog\gcelt\mat mul>java MatrixMultiplication
Enter the number of rows and columns of first matrix
2
2
Enter the elements of first matrix
1
2
3
4
Enter the number of rows and columns of second matrix
2
2
Enter the elements of second matrix
4
3
2
1
Product of entered matrices:-
8       5
20      13

D:\java prog\gcelt\mat mul>
```

6 write a program to implement color band?

```
import java.awt.BorderLayout;
import java.awt.Color;
import java.awt.Dimension;
import java.awt.EventQueue;
import java.awt.GridBagConstraints;
import java.awt.GridBagLayout;
import java.awt.Insets;
import java.awt.event.ActionEvent;
import java.awt.event.ActionListener;
import java.util.ArrayList;
import java.util.Collections;
import java.util.List;
import javax.swing.JFrame;
import javax.swing.JPanel;
import javax.swing.JScrollPane;
import javax.swing.JSlider;
import javax.swing.Timer;
import javax.swing.UIManager;
import javax.swing.UnsupportedLookAndFeelException;
import javax.swing.event.ChangeEvent;
import javax.swing.event.ChangeListener;

public class ColorBands {

    public static void main(String[] args) {
```

```
        new ColorBands();
    }

    public ColorBands() {
        EventQueue.invokeLater(new Runnable() {
            @Override
            public void run() {
                try {
                    UIManager.setLookAndFeel(UIManager.getSystemLookAndFeelClassName());
                } catch (ClassNotFoundException | InstantiationException | IllegalAccessException |
UnsupportedLookAndFeelException ex) {
                }

                JFrame frame = new JFrame("Testing");
                frame.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
                frame.setLayout(new BorderLayout());
                frame.add(new TestPane());
                frame.pack();
                frame.setLocationRelativeTo(null);
                frame.setVisible(true);
            }
        });
    }

    public class TestPane extends JPanel {

        private JPanel bandsPane;
        private JSlider slider;
        private Timer changeTimer;

        public TestPane() {
            bandsPane = new JPanel(new GridBagLayout());
            slider = new JSlider(1, 100);
            setLayout(new BorderLayout());
            add(new JScrollPane(bandsPane));
            add(slider, BorderLayout.SOUTH);
            slider.addChangeListener(new ChangeListener() {
                @Override
                public void stateChanged(ChangeEvent e) {
                    changeTimer.restart();
                }
            });

            changeTimer = new Timer(250, new ActionListener() {
```

```
            @Override
            public void actionPerformed(ActionEvent e) {
                int bands = slider.getValue();
                List<Color> bandsList = getColorBands(Color.RED, bands);
                bandsPane.removeAll();
                GridBagConstraints gbc = new GridBagConstraints();
                gbc.gridwidth = GridBagConstraints.REMAINDER;
                gbc.insets = new Insets(1, 1, 1, 1);
                for (Color color : bandsList) {
                    bandsPane.add(new ColorBand(color), gbc);
                }
                gbc.weighty = 1;
                bandsPane.add(new JPanel(), gbc);
                revalidate();
                repaint();
            }
        });
        changeTimer.setRepeats(false);
        slider.setValue(1);
    }

    @Override
    public Dimension getPreferredSize() {
        return new Dimension(200, 200);
    }
}

public List<Color> getColorBands(Color color, int bands) {

    List<Color> colorBands = new ArrayList<>(bands);
    for (int index = 0; index < bands; index++) {
        colorBands.add(darken(color, (double) index / (double) bands));
    }
    return colorBands;

}

public static Color darken(Color color, double fraction) {

    int red = (int) Math.round(Math.max(0, color.getRed() - 255 * fraction));
    int green = (int) Math.round(Math.max(0, color.getGreen() - 255 * fraction));
    int blue = (int) Math.round(Math.max(0, color.getBlue() - 255 * fraction));

    int alpha = color.getAlpha();
```

```
        return new Color(red, green, blue, alpha);

    }

    public class ColorBand extends JPanel {

        public ColorBand(Color color) {
            setBackground(color);
        }

        @Override
        public Dimension getPreferredSize() {
            return new Dimension(100, 20);}}}
```

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