# W14_COMPUTER PROGRAMMINING 2019 SPRING

## W14 Input/output from files

### IO.java

```java
import java.util.*;
import javax.swing.*;
import java.awt.Font;
class IO
{ static Scanner input = new Scanner( System.in );
 //change font and size for JOptionPane class,//example font "Arial"
 //example size 14
 public static void setOptionPane(String font,int size)
 {UIManager.put("OptionPane.messageFont", new Font(font, Font.PLAIN, size));}
 //array input
 public static double[] Dinput()
 { String s1=JOptionPane.showInputDialog("input double vector");
 StringTokenizer token=new StringTokenizer(s1);
 int n=token.countTokens()-1;
 int m=n+1;
 double a[]=new double[m];
 int j=0;
 while(token.hasMoreTokens())
 {
 Double ax=new Double(token.nextToken());
 a[j++]=ax.doubleValue();
 }
 return a;
 }

 public static double[][] Dinput(int n)
 {double c[][]=new double[n][];
 for(int i=0;i<n;i++)
 {c[i]=Dinput();}
 return c;
 }

 public static int[] Iinput()
 {String s1=JOptionPane.showInputDialog("input int vector");
 StringTokenizer token=new StringTokenizer(s1);
 int n=token.countTokens()-1;
 int m=n+1;
 int a[]=new int[m];
 int j=0;
 while(token.hasMoreTokens())
 {
 Integer ax=new Integer(token.nextToken());
 a[j++]=ax.intValue();
 }
 return a;
 }
 public static int[][] Iinput(int n)
 {int c[][]=new int[n][];
 for(int i=0;i<n;i++)
 {c[i]=Iinput();}
 return c;
 }
 public static String[] input()
 {String s1=JOptionPane.showInputDialog("input String vector");
 StringTokenizer token=new StringTokenizer(s1);
 int n=token.countTokens()-1;
 int m=n+1;
 String a[]=new String[m];
 int j=0;
 while(token.hasMoreTokens())
 {
 String ax=new String(token.nextToken());
 a[j++]=ax;
 }
 return a;
 }
 public static String[][] input(int n)
 {String c[][]=new String[n][];
 for(int i=0;i<n;i++)
 {c[i]=input();}
```

```java
    return c;
    }
  public static String toString(double a[],int n)
  { Locale us=new Locale("us");
  String s1="[";
  for(int i=0;i<a.length;i++)
  { s1+=String.format(us,"%"+n+"f",a[i]);}
  s1+="]\n";
  return s1;
    }
  public static String toString(int a[],int n)
  {String s1="[";
  for(int i=0;i<a.length;i++)
  { s1+=String.format("%"+n+"d",a[i]);}
  s1+="]\n";
  return s1;
    }

  public static String toString(String a[],int n)
  {String s1="[";
  for(int i=0;i<a.length;i++)
  { s1+=String.format("%"+n+"s",a[i]);}
  s1+="]\n";
  return s1;
    }

  public static String toString(double a[][],int n)
  { String s1="";
  for(int i=0;i<a.length;i++)
  { s1+=toString(a[i],n);}
  return s1;
    }

  public static String toString(int a[][],int n)
  { String s1="";
  for(int i=0;i<a.length;i++)
  { s1+=toString(a[i],n);}
  return s1;
    }

  public static String toString(String a[][],int n)
  { String s1="";
  for(int i=0;i<a.length;i++)
  { s1+=toString(a[i],n);}
  return s1;
    }

  public static<E> String toString(Collection<E> c)
  {  String s="";
    Iterator<E> i=c.iterator();
    while(i.hasNext()) {s+=i.next()+"\n";}
    return s;
    }

  public static void print(String s)
  {JOptionPane.showMessageDialog(null,s);}

  public static void Cprint(String s)
  {System.out.print(s);}

  public static void Cprintln(String s)
  {System.out.println(s);}

  public static double DCinput(String s)
  { System.out.print(s);
  return Double.parseDouble(input.next());}

  public static int ICinput(String s)
  { Cprint(s);return input.nextInt();}

  public static String Cinput(String s)
  { Cprint(s);return input.next();}

  public static double Dinput(String s)
  { double x=0;
```

```
  try{
  x=Double.parseDouble(JOptionPane.showInputDialog(s));
  } catch(NumberFormatException e) {System.out.println("number format exception");}
  return x;
  }
  public static int Iinput(String s)
  { int x=0;
  try{
  x=Integer.parseInt(JOptionPane.showInputDialog(s));
  } catch(NumberFormatException e) {System.out.println("number format exception");}
  return x;
  }

  public static String input(String s)
  { return JOptionPane.showInputDialog(s);}
}
```

## W14E1: Read a double number (by using relevant class IO methods)calculate log by given method and print x and log(x)  (by using relevant class IO methods)

```
import javax.swing.*;

public class W14E1
{    public static double log(double x)
    {double y=(x-1.0)/(x+1.0);
      double power=2.0*y;
      double z=y*y;
      int n=0;
      double ln=0;
      while(n<=300)
      {
      ln+=1./(2.0*n+1.0)*power;
      power*=z;
      n++;
      }
    return ln;
    }

    // main method begins execution of Java application
    public static void main( String args[] )
    {
    } // end method main
} // end of class
```

## W14E2: read two integer number by using class IO method IO.Iinput(String s) calculate prime numbers by using method prime and as an output obtain the following result.
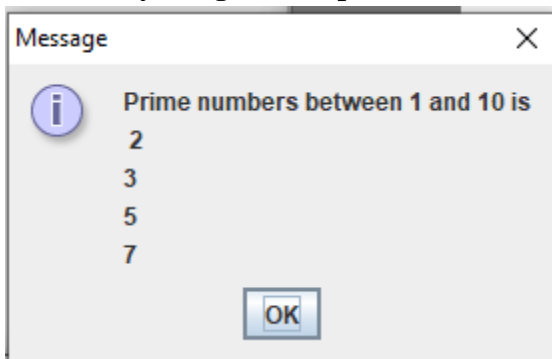


```
import javax.swing.*;
class W14E2
{    public static String prime(int n1,int n2)
    { int i,j;
      String s=" ";
      for(i=n1;i<=n2;i++)
      {for(j=2;j<i && (i%j)!=0;j++) {}
      if(i==j) {s+=i+"\n";}
      }
      return s;
```

```java
    }
    public static void main(String args[])
    {   int n1=
         int n2=
         String s=
         IO.print(s);
    }
}
```

```java
            import java.io.*;
            import java.util.*;
            import javax.swing.*;
    import javax.swing.table.*;
    import java.awt.*;

class data1
            {
            public double x[];
            public data1(double[] xi)
            {
            int n=xi.length;
            x=new double[n];
            for(int i=0;i<n;i++) {x[i]=xi[i];}
            }
            public String toString() {return ""+x[0]+" "+x[1];}
            }

public class W14E3
{
    public static double[][] inputdouble(String filename) throws IOException
    {
            //reading double values from one line of data
            BufferedReader fin=new BufferedReader(new FileReader(filename));
    double a[][]=inputdouble(fin);
    return a;
    }

    public static double[][] inputdouble(BufferedReader fin) throws IOException
    {
            ArrayList<data1> a=new ArrayList<data1>();
            int mmax=0;
            double b[][];
            int n=0,m=0;
            String s1="";
            try{
    while(fin!=null)
    { s1=fin.readLine();
    if(s1==null)break;
     StringTokenizer token=new StringTokenizer(s1);
     m=token.countTokens();
     if(m>mmax) mmax=m;
     double aa[]=new double[m];
     int j=0;
     while(token.hasMoreTokens())
     { Double ax=new Double(token.nextToken());
      aa[j++]=ax.doubleValue();
     }
     data1 vx=new data1(aa);
     a.add(vx);
    n++;
            }
    } catch(EOFException e_eof)
     {
     //close ffile
     try{fin.close();
    }
    catch(NullPointerException e) {}
    catch(IOException e)
        {
        System.err.println("Error Closing File\n"+e.toString());
        System.exit(1);
        }
     } //End of EOFException
```

```java
    b=new double[n][mmax];
    int k=0;
    Iterator<data1> i=a.iterator();
    while(i.hasNext()) {data1 vx=i.next();b[k++]=vx.x;}
    return b;
    }
    public static String toString(double a[][])
    {String s="";
    for(int i=0;i<a.length;i++)
    { for(int j=0;j<a[0].length;j++)
    {s+="a["+i+"]["+j+"] = "+a[i][j]+" ";}
    s+="\n";
    }
    return s;
             }

 public static void main(String args[]) throws IOException
 {
  String s1="matrix1.txt";
  File f=new File(s1);
  BufferedReader fin=new BufferedReader(new FileReader(f));
  double number[][]=
  IO.print(…);
 }}
```

**W14E3 write the following file as matrix1.txt**


**1.1  2.2 3.3**
**1.2  2.3 3.4**
**1.3  2.4 3.5**
**1.4  2.5  3.6**


**read file matrix1.txt as double matrix by BufferedReader, output matrix by using IO.toString**
**and IO.print methods**

```java
            import java.io.*;
            import java.util.*;
            import javax.swing.*;
     import javax.swing.table.*;
     import java.awt.*;

 class data1
            {
            public double x[];
            public data1(double[] xi)
            {
            int n=xi.length;
            x=new double[n];
            for(int i=0;i<n;i++) {x[i]=xi[i];}
            }
            public String toString() {return ""+x[0]+" "+x[1];}
            }

 public class W14E3
 {
    public static double[][] inputdouble(String filename) throws IOException
    {
            //reading double values from one line of data
            BufferedReader fin=new BufferedReader(new FileReader(filename));
    double a[][]=inputdouble(fin);
    return a;
    }

    public static double[][] inputdouble(BufferedReader fin) throws IOException
    {
            ArrayList<data1> a=new ArrayList<data1>();
            int mmax=0;
            double b[][];
            int n=0,m=0;
            String s1="";
```

```
        try{
    while(fin!=null)
    { s1=fin.readLine();
    if(s1==null)break;
     StringTokenizer token=new StringTokenizer(s1);
     m=token.countTokens();
     if(m>mmax) mmax=m;
     double aa[]=new double[m];
     int j=0;
     while(token.hasMoreTokens())
     { Double ax=new Double(token.nextToken());
      aa[j++]=ax.doubleValue();
     }
     data1 vx=new data1(aa);
     a.add(vx);
    n++;
             }
    } catch(EOFException e_eof)
     {
     //close ffile
     try{fin.close();
    }
    catch(NullPointerException e) {}
    catch(IOException e)
        {
        System.err.println("Error Closing File\n"+e.toString());
        System.exit(1);
        }
     } //End of EOFException
    b=new double[n][mmax];
    int k=0;
    Iterator<data1> i=a.iterator();
    while(i.hasNext()) {data1 vx=i.next();b[k++]=vx.x;}
    return b;
    }
    public static String toString(double a[][])
    {String s="";
    for(int i=0;i<a.length;i++)
    { for(int j=0;j<a[0].length;j++)
    {s+="a["+i+"]["+j+"] = "+a[i][j]+" ";}
    s+="\n";
    }
    return s;
             }
 public static void main(String args[]) throws IOException
 {
  String s1="matrix1.txt";
  File f=new File(s1);
  BufferedReader fin=new BufferedReader(new FileReader(f));
  double number[][]=inputdouble(fin);
  IO.print(IO.toString(number,10));
 }}
```

**W13E4** Following programs are given to calculate $\int_0^1 (x^2 - 1)dx$ (by using abstract class fun_x and class fun1)

Change the program to calculate $\int_0^{2.4} (x^3 - 2x + 2.3)dx$

```
//abstract class
abstract public class fun_x
{abstract public double f(double x);
public double integral(double a,double b)
{
//integral f(x)dx
//integral of a function by using gauss-legendre quadrature
//coefficients are pre-calculated for 60 terms for [-1,1]
//band then utilises variable transform
 double r[],c[];
 r=new double[10];
 c=new double[10];
 r[0]=-0.973906528517171;
```

```
   r[1]=-0.865063366688984;
   r[2]=-0.679409568299024;
   r[3]=-0.433395394129247;
   r[4]=-0.148874338981631;
   r[5]=0.148874338981631;
   r[6]=0.433395394129247;
   r[7]=0.679409568299024;
   r[8]=0.865063366688984;
   r[9]=0.973906528517171;

   c[0]=0.066671344308684;
   c[1]=0.149451349150580;
   c[2]=0.219086362515982;
   c[3]=0.269266719309996;
   c[4]=0.295524224714752;
   c[5]=0.295524224714752;
   c[6]=0.269266719309996;
   c[7]=0.219086362515982;
   c[8]=0.149451349150580;
   c[9]=0.066671344308684;

   int n=10;

   double z=0;
   double x,y;
   double k1=(b-a)/2.0;
   double k2=(b+a)/2.0;
   double y1=0;
   for(int i=0;i<n;i++)
   {
   x=k2+k1*r[i];
   y=f(x);
   y1=c[i]*y;
   z+=y1;
   System.out.println("x="+x+"y="+y+"y1="+y1+"z="+z);
   }
   return k1*z;
   }

   }
```

```
public class fun1 extends fun_x
{ public double f(double x)
  {return x*x+1.0;}
}
```

```
import javax.swing.*;
class W14E4
{    public static void main(String args[])
    {    fun1 y=new fun1();
        double x=1.0;
        String s="x= "+x+" f("+x+") = "+y.f(x)+" integral = "+y.integral(0.0,1.0);
        IO.print(s);
    }
}
```

**W13E5** Following programs are given to calculate $\int_0^1 (x^2 - 1)dx$ (by using interface ifun_x and class ifun1)

Change the program to calculate $\int_0^{2.4} (x^3 - 2x + 2.3)dx$

```
 @FunctionalInterface
interface ifun_x
{  public double f(double x);
default double integral(double a,double b)
{
//integral f(x)dx
//integral of a function by using gauss-legendre quadrature
//coefficients are pre-calculated for 60 terms for [-1,1]
//band then utilises variable transform
 double r[],c[];
```

```
  r=new double[10];
 c=new double[10];
 r[0]=-0.973906528517171;
 r[1]=-0.865063366688984;
 r[2]=-0.679409568299024;
 r[3]=-0.433395394129247;
 r[4]=-0.148874338981631;
 r[5]=0.148874338981631;
 r[6]=0.433395394129247;
 r[7]=0.679409568299024;
 r[8]=0.865063366688984;
 r[9]=0.973906528517171;

 c[0]=0.066671344308684;
 c[1]=0.149451349150580;
 c[2]=0.219086362515982;
 c[3]=0.269266719309996;
 c[4]=0.295524224714752;
 c[5]=0.295524224714752;
 c[6]=0.269266719309996;
 c[7]=0.219086362515982;
 c[8]=0.149451349150580;
 c[9]=0.066671344308684;

 int n=10;

 double z=0;
 double x,y;
 double k1=(b-a)/2.0;
 double k2=(b+a)/2.0;
 double y1=0;
 for(int i=0;i<n;i++)
 {
 x=k2+k1*r[i];
 y=f(x);
 y1=c[i]*y;
 z+=y1;
 }
 return k1*z;
 }
}
```

```
public class ifun1 implements ifun_x
{ public double f(double x)
  {return x*x+1.0;}
}
```

```
import javax.swing.*;
class W14E5
{    public static void main(String args[])
    {   ifun1 y=new ifun1();
        double x=1.0;
        String s="x= "+x+" f("+x+") = "+y.f(x)+" integral = "+y.integral(0.0,1.0);
        IO.print(s);
    }
}
```

**W14E6** Following programs are given to calculate $\int_0^1 (x^2 - 1)dx$ (by using interface ifun_x and lambda variables)

Change the program to calculate $\int_0^{2.4} (x^3 - 2x + 2.3)dx$

```
import javax.swing.*;
class W14E6
{    public static void main(String args[])
    {   ifun_x z=x->x*x+1;
        double x=1.0;
        String s="x= "+x+" f("+x+") = "+z.f(x)+" integral = "+z.integral(0.0,1.0);
        IO.print(s);
    }
}
```

## W14E7 List cars acording to brand than model then year

```java
public class book
{ public String name,author;
  int year;
  public book(String namei,String authori,int yeari)
  {name=namei;author=authori;year=yeari;}
  public book(book bi)
  {name=bi.name;author=bi.author;year=bi.year;}
  public String toString()
  {String s="book name = "+name+" book author = "+author+" publication year = "+year+"\n";
   return s;
  }
}
```

```java
import java.util.*;

public class library
{
String name;
int number_of_books;
TreeMap <String, book> book_name = new TreeMap<String, book>();
TreeMap <String, book> author_name = new TreeMap<String, book>();

public library(String kname)
{name=kname;
 number_of_books=0;
}

public void add(book b)
{
book_name.put(b.name,b);
author_name.put(b.author,b);
number_of_books=book_name.size();
}

public void remove(book b)
{
number_of_books--;
book_name.remove(b.name);
author_name.remove(b.author);
number_of_books=book_name.size();
}

public String list_with_name()
{String s=book_name.values().toString();
return s;
}

public String list_with_author()
{String s=author_name.values().toString();
return s;
}

public String get_with_name(String name)
{String s=book_name.get(name).toString();
return s;
}

 public String toString_with_name()
 {        String s="Library name : "+name+"\n";
    s+="Total number of books : "+number_of_books+"\n";
    s+=list_with_name()+"\n";
    return s;
 }
 public String toString_with_author()
 {        String s="Library name : "+name+"\n";
    s+="Total number of books : "+number_of_books+"\n\n";
    s+=list_with_author();
    return s;
}}
```

Add books to the library and print them out according to authors and according to names

```
class booktest1
{
public static void main(String args[])
{
library l=new library("Library of congress");
book magazine=new book("Bilim ve Teknik","TÜBİTAK",1978);
book r1=new book("It is all quiet in the westen front ","Erich Maria Reamarque",1920);
book r2=new book("The God Delusion","Richard Dawkins",2010);
book s1=new book("Human lanscapes from my country","Nazım Hikmet",1935);
……..
………….}
}
```

## W14E8  Program to plot sin(x) is given. Change the program to plot $\left(x^3 - 2x + 2.3\right)$ betwee limits 0 to 2.0

```
 import javax.swing.*;

class W14E8 {
public static void main(String args[])
{
ifun_x ff=(x)->Math.sin(x);
plot2P pp=new plot2P(ff,0.0,2.0*Math.PI,500,500);
FrameGraphic.plot("Plot window",pp);
}}
```

```
import javax.swing.*;
import java.awt.Graphics;
import java.awt.*;
import java.awt.event.*;
import java.awt.geom.*;
// a simple plot program
public class plot2P extends JPanel
{ private static final long serialVersionUID = 6476348L;
 int x[];
 int y[];
 double xmin;
 double xmax;
 int n;
 int width;
 int height;
 double x1,x2,y1,y2;
 public plot2P(ifun_x f,double xmini,double xmaxi,int widthi,int heighti)
 {
  // height : height of the plot window;
  // width  : width of the plot window
  // xmin minimum x value
  // x maximum x value
  xmin=xmini;
  xmax=xmaxi;
  width=widthi;
  height=heighti;
  n=100;
  x=new int[n+1];
  y=new int[n+1];
  double xd[]=new double[n+1];
  double yd[]=new double[n+1];
  double ymin=1.0e60;
  double ymax=-1.0e60;
  for(int i=0;i<=n;i++)
  {xd[i] = (xmax-xmin)*(double)i/(double)n;
   yd[i] =  f.f(xd[i]);
   if(yd[i]<ymin) ymin=yd[i];
   if(yd[i]>ymax) ymax=yd[i];
  }
  for(int i=0;i<=n;i++)
  {x[i]=(int)(0.8*width*xd[i]/(xmax-xmin));
   y[i]=height/3+(int)(0.6*height*yd[i]/(ymax-ymin));
  }
  x1=0;
  x2=(int)(0.8*width*(2.0*Math.PI)/(xmax-xmin));
  y1=height/3;
```

```
  y2=height/3;
}

public void paintComponent(Graphics g)
{
Graphics2D g2=(Graphics2D)g;
g2.setRenderingHint(RenderingHints.KEY_ANTIALIASING, RenderingHints.VALUE_ANTIALIAS_ON);
GeneralPath pp=new GeneralPath();
pp.moveTo(x[0],y[0]);
for(int i=1;i<x.length;i++)
{pp.lineTo(x[i],y[i]);}
//pp.closePath();
g2.setColor(Color.blue);
g2.draw(pp);
final float dash1[] = {10.0f};
final BasicStroke d1 = new BasicStroke(1.0f,BasicStroke.CAP_BUTT,
                                 BasicStroke.JOIN_MITER,
                                 3.0f, dash1, 2.0f);
g2.setStroke(d1);
Line2D xx=new Line2D.Double(x1,y1,x2,y2);
g2.draw(xx);
g2.setStroke(new BasicStroke(1.0f));
Rectangle2D r=new Rectangle2D.Double(0,0,height,width);
g2.draw(r);
}

}
```

```
import javax.swing.*;
import java.awt.Graphics;
import java.awt.*;
import java.awt.event.*;
public class FrameGraphic extends JFrame
{  private static final long serialVersionUID = 98579857L;
 JPanel d;
  public FrameGraphic(String a,JPanel di)
  {   super(a);
     d=di;
     add(d);
  }
  public static void plot(String a,JPanel di)
  {
     FrameGraphic f = new FrameGraphic(a,di);
     f.setDefaultCloseOperation( JFrame.EXIT_ON_CLOSE );
     f.setSize(800,500);
     f.setVisible(true);
  }
}
```