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// PROGRAM complex

import java.io.*;

class complex
{
          double re,im;
          complex(double r,double i)
           {
            re=r;
            im=i;
           }

          complex add(complex p)
           {
            complex q=new complex(0,0);
            q.re=re+p.re;
            q.im=im+p.im;
            return q;
           }
       complex mul(double s)
           {
            complex q=new complex(re,im);
            q.re=s*q.re;
            q.im=s*q.im;
            return q;
           }

       void display()
           {
            System.out.println(re+"+i"+im);
           }
}

abstract class basevector
{

          double rvector[];
          complex cvector[];
          DataInputStream rd;
          basevector()
           {
            rd=new DataInputStream(System.in);
           }
       public abstract basevector add(basevector p);
       public abstract void showvector();
       public abstract void scalarmul(double a);
       public abstract void readvector();
}

class realvector extends basevector
{
       private int i,n;
          realvector(int j)
           {
            super();
            rvector=new double[10];
            n=j;
            for(i=0;i<n;i++)
            rvector[i]=0;
           }
          public void readvector()
           {
            for(i=0;i<n;i++)
              {
               System.out.println("Enter the "+(i+1)+" th component");
               try
                  {
                   rvector[i]=Integer.parseInt(rd.readLine());
                  }
               catch(IOException e)
                  {
                   rvector[i]=0;
                  }
            }
}

public basevector add(basevector p)
{
          for(i=0;i<n;i++)
           {
             p.rvector[i]=rvector[i]+p.rvector[i];
           }
          return p;
}

public void scalarmul(double a)
{
          for(i=0;i<n;i++)
           {
            rvector[i]=rvector[i]*a;
           }
}

public void showvector()
{
          System.out.print("(");
          for(i=0;i<n;i++)
           {
             System.out.print(rvector[i]);
             if(i!=(n-1))
             System.out.print(",");
           }

          System.out.print(")");
}
}


class Cvector extends basevector
{
          private int i;
          private int j,n;
          int r,im;
          Cvector(int k)
           {
            super();
            cvector = new complex[10];
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               n=k;
               for(i=0;i<n;i++)
               cvector[i]=new complex(0,0);
             }

            public void readvector()
             {
               for(i=0;i<n;i++)
                {
                        System.out.println("Enter the "+(i+1)+" th component");
                        try
                         {
                                    r=Integer.parseInt(rd.readLine());
                                    im=Integer.parseInt(rd.readLine());
                         }
                        catch(IOException e)
                         {
                                r=0;
                                    im=0;
                          }

                        cvector[i]=new complex(r,im);
                  }
         }

            public basevector add(basevector p)
             {
               Cvector c=new Cvector(n);
               for(i=0;i<n;i++)
                  {
                         c.cvector[i]=cvector[i].add(p.cvector[i]);
                  }
               return c;
             }

            public void scalarmul(double a)
             {
               for(i=0;i<n;i++)
                {
             cvector[i]=cvector[i].mul(a);

            }
         }

        public void showvector()
             {
                System.out.print("(");
                for(i=0;i<n;i++)
                  {
                   cvector[i].display();
                   System.out.print(",");
                  }
                System.out.print(")");
             }
}

public class vector
{
            public static void main(String args[]) throws NumberFormatException,IOException
            {
                        DataInputStream rd=new DataInputStream(System.in);
                        int choice1,choice2,n;
                        double r,im;
                        basevector r1,r2;
                        while(true)
                         {
                                    System.out.println("Menu\n1.Real vector\n2.Complex vector\n3.Exit\n");
                                    choice1=Integer.parseInt(rd.readLine());

                                    switch(choice1)
                                      {
                                            case 1:
                                                    System.out.println("Enter the dimension");
                                                    n=Integer.parseInt(rd.readLine());
                                                    r1=new realvector(n);
                                                    r1.readvector();

                                                    a: while(true)
                                                    {
                                                            System.out.println("\n1.Add\n2.Scalar
multiplication\n3.Dispaly\n4.Back\t");
                                                            choice2=Integer.parseInt(rd.readLine());

                                                            switch(choice2)
                                                             {
                                                              case 1:
                                                                    System.out.println("Enter a vector of dimension
"+n);

                                                                    r2=new realvector(n);
                                                                    r2.readvector();
                                                                    r1=r1.add(r2);
                                                                    r1.showvector();
                                                                    break;
                                                              case 2:
                                                                    System.out.println("Enter a scalar:");
                                                                    r=Integer.parseInt(rd.readLine());
                                                                    r1.scalarmul(r);
                                                                    r1.showvector();
                                                                    break;
                                                              case 3:
                                                                    r1.showvector();
                                                                    break;
                                                              case 4:
                                                              break a;
                                                             }
                                                    }
                                                    break;
                                          case 2:
                                                    System.out.println("Enter the dimension:");
                                                    n=Integer.parseInt(rd.readLine());
                                                    r1=new Cvector(n);
                                                    r1.readvector();
                                                    b: while(true)
                                                     {
                                                       System.out.println("1.Add\n2.Scalar
multiplication\n3.Display\n4.Back\n");
                                                       choice2=Integer.parseInt(rd.readLine());
                                                       switch(choice2)
                                                            {
                                                              case 1:
                                                                     System.out.println("Enter a vector of
dimension"+n);

                                                                     r2=new Cvector(n);
                                                                     r2.readvector();
                                                                     r1=r1.add(r2);
                                                                     r1.showvector();
                                                                     break;
                                                              case 2:
                                                                     System.out.println("Enter a scalar:");
                                                                     r=Integer.parseInt(rd.readLine());
                                                                     r1.scalarmul(r);
                                                                     r1.showvector();
                                                                     break;
                                                              case 3:
                                                                     r1.showvector();
                                                                     break;
                                                              case 4:
                                                                     break b;
                                                            }
                                                    }
                                                    break;
                                         case 3:
                                                    System.exit(0);
                                    }
                        }
            }
}
```