Java Programming
CSE 1007

Lab Assignment 1
Arrays and Loops

Submitted by
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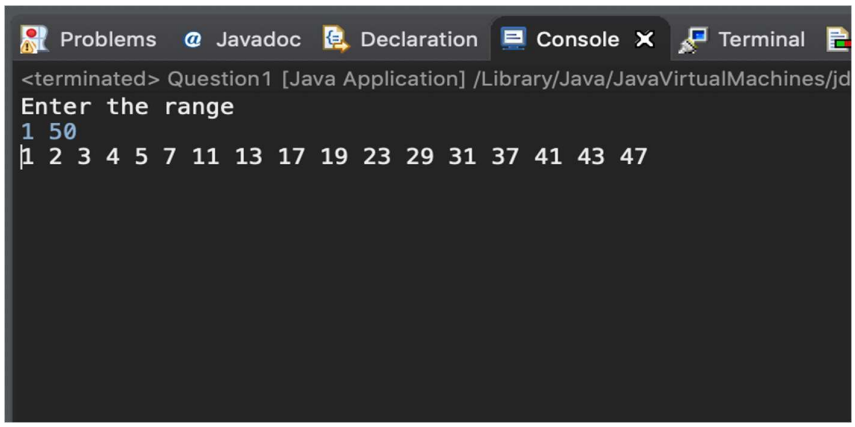
Question 1
Write a Java program to display all the prime numbers within a range.

Code

```
import java.util.*;
class Question1
{
	public static void main(String args[])
	{
		Scanner sc = new Scanner(System.in);
		int a, b, c;
		int i, j;
		System.out.println("Enter the range");
		a=sc.nextInt();
		b=sc.nextInt();

		for(i=a;i<=b;i++)
		{
			c=0;
			for(j=2;j<i/2;j++)
			{
				if(i%j==0)
				{
					c=1;
					break;
				}
			}
			if(c==0)
			{
				System.out.print(i+" ");
			}
		}
	}
}
```

Output



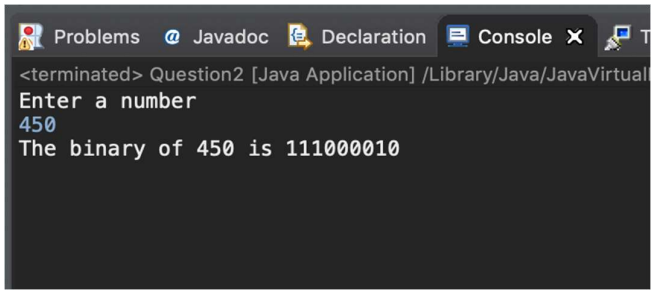
Question 2

Write a Java program to convert a decimal number to its equivalent binary number.
Eg: $25_{10} = 11001_2$

Code

```
import java.util.*;
public class Question2
{
	public static void main(String args[])
	{
		//Program to convert a decimal number into its equivalent binary number
		Scanner sc = new Scanner(System.in);
		int num;
		System.out.println("Enter a number");
		num = sc.nextInt();
		String bin="";
		int rem, temp=num;
		while(temp>0)
		{
			rem = temp%2;
			bin = Integer.toString(rem)+bin;
			temp/=2;
		}
		System.out.println("The binary of "+num+" is "+bin);
	}
}
```

Output



Question 3

Write a Java program to print the following patterns by reading the number of lines from the user.

1.

```
*
**
***
****
*****
```

2.

```
    *
   * *
  * * *
 * * * *
* * * * *
```

3.

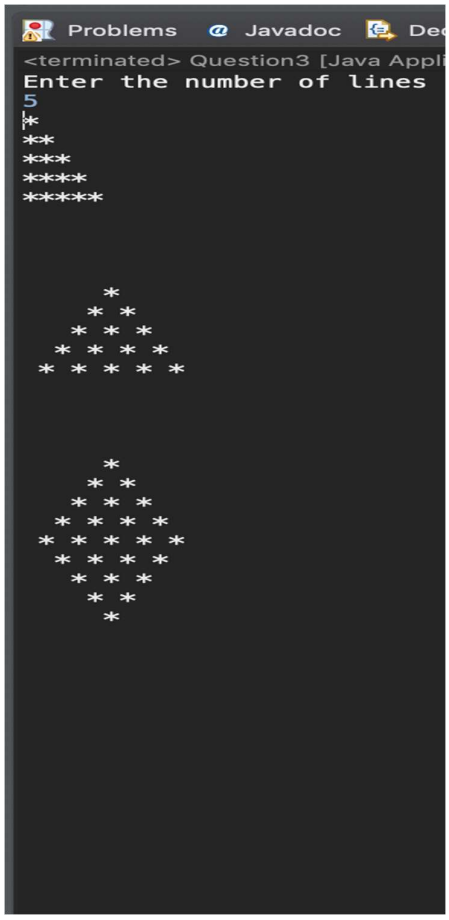
```
    *
   * *
  * * *
 * * * *
  * * *
   * *
    *
```

Code

```
import java.util.*;
public class Question3 {
	public static void main(String args[])
	{
		//Printing Patterns
		Scanner sc = new Scanner(System.in);
		int n,c;
		System.out.println("Enter the number of lines");
		n = sc.nextInt();
		int i,j,k;
		//Printing pattern1

		for(i=1;i<=n;i++)
		{
			for(j=1;j<=i;j++)
			{
				System.out.print("*");
			}
			System.out.println();
		}
		//Printing Pattern 2
		System.out.println("\n\n\n");
		c=n;
		for(i=1;i<=n;i++)
		{
			for(k=1;k<=c;k++)
			{
				System.out.print(" ");
			}
			c-=1;
			for(j=1;j<=i;j++)
			{
				System.out.print("* ");
			}
			System.out.println();
		}
		System.out.println("\n\n\n");

		//Printing Pattern 3
		c=n;
		for(i=1;i<=n;i++)
		{
			for(k=1;k<=c;k++)
			{
				System.out.print(" ");
			}
			c-=1;
			for(j=1;j<=i;j++)
			{
				System.out.print("* ");
			}
```

```
                System.out.println();
            }

            c=2;

            for(i=n-1;i>=1;i--)
            {
                for(k=1;k<=c;k++)
                {
                    System.out.print(" ");
                }
                c+=1;
                for(j=1;j<=i;j++)
                {
                    System.out.print("* ");
                }
                System.out.println();
            }
        }
}
```

Output



Question 4

Write a Java program to sum up all the digits of an integer till the sum is a single digit. Eg: INPUT = 9985

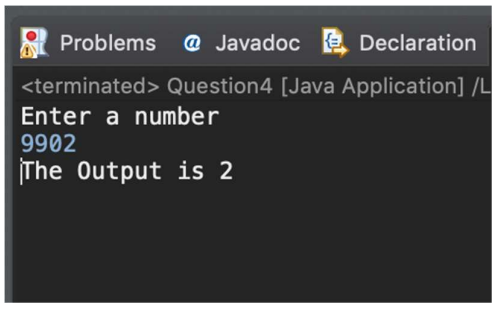
9+9+8+5 = 31

3+1 = 4 OUTPUT = 4

Code

```
import java.util.*;

public class Question4 {
	public static void main(String args[])
	{
		Scanner sc = new Scanner(System.in);
		int n;
		System.out.println("Enter a number");
		n = sc.nextInt();

		//Finding the sum of digits till the number is a single digit
		int num=n;
		int digit, sum=num;
		do
		{
			num = sum;
			sum=0;
			while(num>0)
			{
				digit = num%10;
				sum+=digit;
				num/=10;
			}
		}
		while(sum>=10);

		System.out.println("The Output is "+sum);
	}
}
```

Output



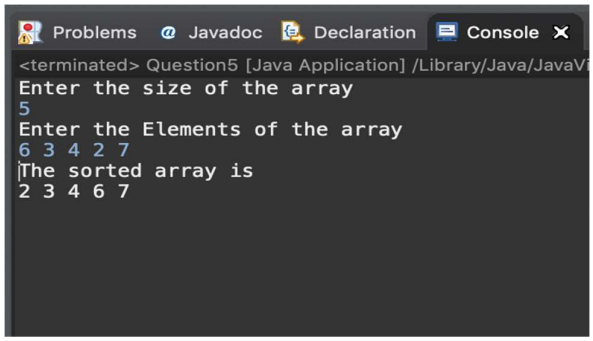
Question 5

Write a Java program to sort a numerical array using selection sort algorithm and remove all the duplicates from the same array. [Hint: Use single array]

Code

```
import java.util.*;
public class Question5
{
	public static void main(String args[])
	{
		//Selection sort
		Scanner sc = new Scanner(System.in);
		int len;
		int i, j, temp;
		System.out.println("Enter the size of the array");
		len = sc.nextInt();
		System.out.println("Enter the Elements of the array");
		int a[] = new int[10];
		for(i=0;i<len;i++)
		{
			a[i] = sc.nextInt();
		}

		//Selection sort algorithm
		int minpos = 0;
		for(i=0;i<len-1;i++)
		{
			minpos=i;
			for(j=i+1;j<len;j++)
			{
				if(a[j]<a[minpos])
					minpos = j;
			}
			//Swapping
			temp = a[minpos];
			a[minpos] = a[i];
			a[i] = temp;
		}
		System.out.println("The sorted array is ");
		for(i=0; i<len;i++)
		{
			System.out.print(a[i]+" ");
		}
		System.out.println();
	}
}
```

Output



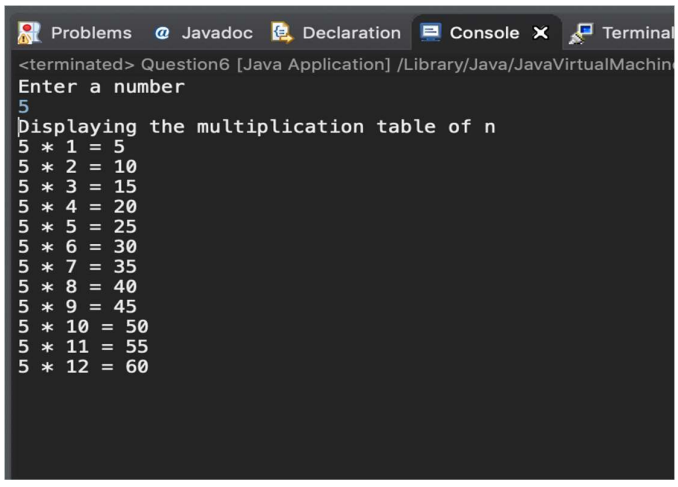
Question 6

Write a Java program to read an integer ‘n’ from the user and display the multiplication table of ‘n’.

Code

```
import java.util.*;
public class Question6 {
	public static void main(String args[])
	{
		Scanner sc = new Scanner(System.in);
		int n;
		System.out.println("Enter a number");
		n = sc.nextInt();
		System.out.println("Displaying the multiplication table of n");
		for(int i=1;i<=12;i++)
		{
			System.out.println(n+" * "+i+" = "+(n*i));
		}
	}
}
```

Output



Question 7

Write a Java program to list out the elements in an array having mid property. An element in an array is said to have the mid property if its left element is lesser than it and also the right element is greater than it.

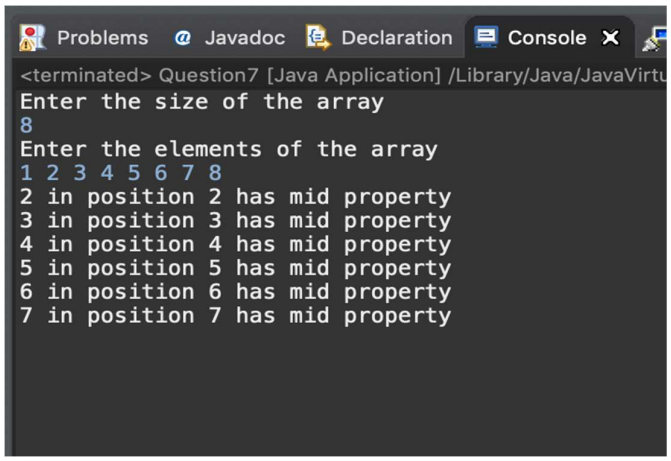
Eg: ..... , 3, 5, 9, ...

5 is having mid property.

Code

```
import java.util.*;
public class Question7
{
	public static void main(String args[])
	{
		Scanner sc = new Scanner(System.in);
		int len;
		//System.out.println();
		System.out.println("Enter the size of the array");
		len = sc.nextInt();
		int a[] = new int[len];
		int i;
		System.out.println("Enter the elements of the array");
		for(i=0;i<len;i++)
		{
			a[i] = sc.nextInt();
		}
		for(i=1;i<len-1;i++)
		{
			if(a[i-1]<a[i] && a[i+1]>a[i])
			{
				System.out.println(a[i]+" in position "+(i+1)+" has mid property");
			}
		}

	}
}
```

Output



Question 8

Print Hailstone sequence for a number.

(Note: Take any positive integer n. If n is even, divide it by 2 to get n / 2. If n is odd, multiply it by 3 and add 1 to obtain 3n + 1. Repeat the process indefinitely. The conjecture is that no matter what number you start with, you will always eventually reach 1.)

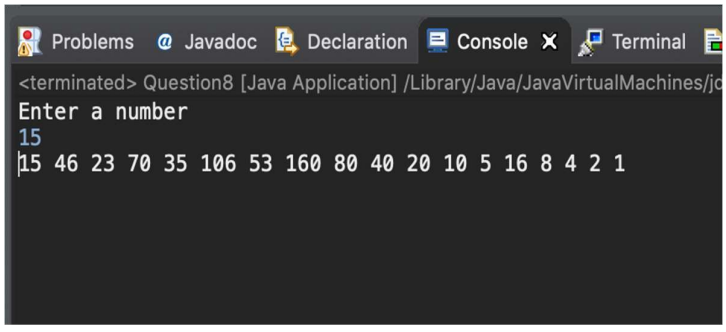
Eg. Hailstone sequence of 15 is

15, 46, 23, 70, 35, 106, 53, 160, 80, 40, 20, 10, 5, 16, 8, 4, 2, 1

Code

```
import java.util.*;
public class Question8
{
	public static void main(String args[])
	{
		Scanner sc = new Scanner(System.in);
		int n;
		System.out.println("Enter a number");
		n = sc.nextInt();
		//Printing the hailstone sequence
		int num = n;
		while(num!=1)
		{
			if(num%2 == 0)
			{
				num/=2;
			}
			else
			{
				num = 3*num +1;
			}
			System.out.print(num+" ");
		}
	}
}
```

Output



Question 9

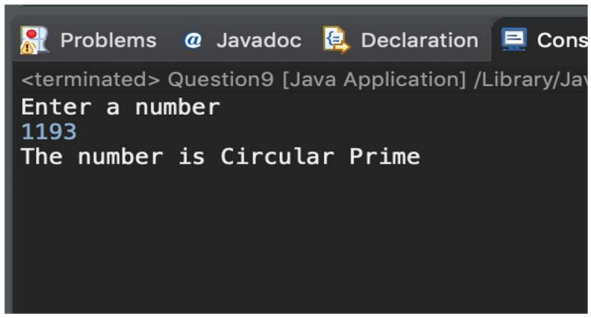
Find whether an entered number is CIRCULAR PRIME or not. Display YES if it is a circular prime, otherwise display NO. A circular prime number is a number that remains prime on any cyclic rotation of its digits (in base 10).
For example 1193 is circular prime because 1931, 9311, 3119 and 1193 are all prime numbers.

Code

```
import java.util.*;
public class Question9
{
	static boolean isprime(int num)
	{
		int i, c=0;
		for(i=2;i<num/2;i++)
		{
			if(num%i==0)
			{
				c+=1;
				break;
			}
		}
		if(c==0)
			return true;
		else
			return false;


	}
	static String permute(String s)
	{

		return s.substring(1)+ s.substring(0,1);
	}

	public static void main(String args[])
	{
		Scanner sc = new Scanner(System.in);
		int n;
		System.out.println("Enter a number");
		n = sc.nextInt();
		//Step 1: Permuting the numbers
		int i, num, c=0;

		String s = Integer.toString(n);
		for(i=0;i<s.length();i++)
		{
			num = Integer.parseInt(s);
			if(!isprime(num))
			{
				c+=1;
```

```
                        break;
                }
                //Permute
                s = permute(s);
        }
        if(c==0)
                System.out.println("The number is Circular Prime");
        else
                System.out.println("The number is not Circular Prime");
    }
}
```

Output



Question 10

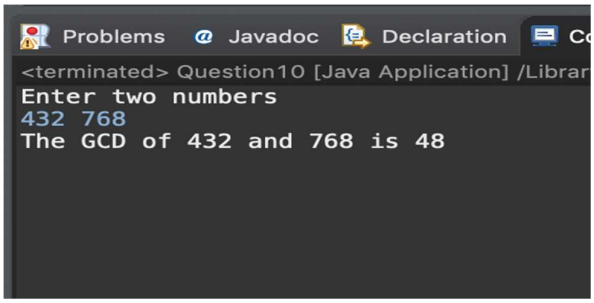
Write a Java program to find out the greatest common divisor of two input values using a function.

Code

```
import java.util.*;
public class Question10
{
    //Function to return the GCD of two numbers
    static int gcd(int a, int b)
    {
        int rem=1;
        while(rem!=0)
        {
            rem = b%a;
            b=a;
            a=rem;
        }
        return b;

    }
    public static void main(String args[])
    {
        Scanner sc = new Scanner(System.in);
        int a, b;
        System.out.println("Enter two numbers");
        a = sc.nextInt();
        b = sc.nextInt();
```

```
            System.out.println("The GCD of "+a+" and "+b+" is "+ gcd(a,b));
        }
}
```

Output



Question 11

Write a Java program to reverse the contents of the array using different functions for different types of array (without using any secondary array for reversing).

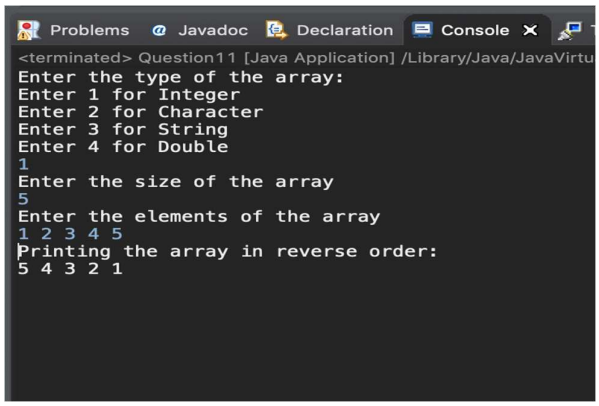
Code

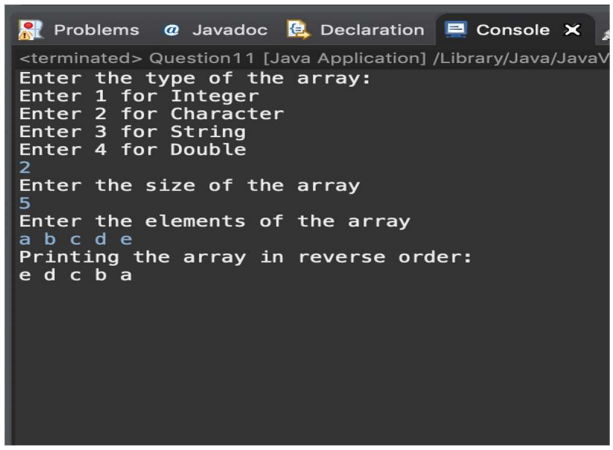
```
import java.util.*;

public class Question11
{
        static int[] revint(int a[])
        {
                int len = a.length;
                int end = len-1, temp;

                for(int i=0;i<len/2;i++)
                {
                        temp = a[i];
                        a[i]=a[end];
                        a[end]=temp;
                        end-=1;
                }

                return a;
        }

        static char[] revchar(char a[])
        {
                int len = a.length;
                int end = len-1;
                char temp;

                for(int i=0;i<len/2;i++)
                {
                        temp = a[i];
                        a[i]=a[end];
                        a[end]=temp;
```

```
                end-=1;
            }

            return a;
        }

        static String[] revstring(String a[])
        {
            int len = a.length;
            int end = len-1;
            String temp;

            for(int i=0;i<len/2;i++)
            {
                temp = a[i];
                a[i]=a[end];
                a[end]=temp;
                end-=1;
            }


            return a;
        }

        static double[] revdouble(double a[])
        {
            int len = a.length;
            int end = len-1;
            double temp;

            for(int i=0;i<len/2;i++)
            {
                temp = a[i];
                a[i]=a[end];
                a[end]=temp;
                end-=1;
            }

            return a;
        }

        public static void main(String args[])
        {
            Scanner sc = new Scanner(System.in);
            System.out.println("Enter the type of the array:\nEnter 1 for Integer \nEnter 2 for
Character \nEnter 3 for String \nEnter 4 for Double");
            int ch=sc.nextInt();
            System.out.println("Enter the size of the array");
            int len = sc.nextInt();

            int i;
```

```
                System.out.println("Enter the elements of the array");
                switch(ch)
                {
                        case 1:
                                int a[] = new int[len];
                                for(i=0;i<len;i++)
                                        a[i] = sc.nextInt();
                                System.out.println("Printing the array in reverse order: ");
                                a = revint(a);
                                for(i=0;i<len;i++)
                                        System.out.print(a[i]+" ");
                                break;
                        case 2:
                                char b[] = new char[len];
                                for(i=0;i<len;i++)
                                        b[i] = sc.next().charAt(0);
                                System.out.println("Printing the array in reverse order: ");
                                b = revchar(b);
                                for(i=0;i<len;i++)
                                        System.out.print(b[i]+" ");
                                break;
                        case 3:
                                sc.nextLine();
                                String c[] = new String[len];
                                for(i=0;i<len;i++)
                                        c[i] = sc.nextLine();
                                for(i=0;i<len;i++)
                                        System.out.print(c[i]+" ");
                                System.out.println();
                                System.out.println("Printing the array in reverse order: ");
                                c = revstring(c);
                                for(i=0;i<len;i++)
                                        System.out.print(c[i]+" ");
                                break;
                        case 4:
                                double d[] = new double[len];
                                for(i=0;i<len;i++)
                                        d[i] = sc.nextDouble();
                                System.out.println("Printing the array in reverse order: ");
                                d = revdouble(d);
                                for(i=0;i<len;i++)
                                        System.out.print(d[i]+" ");
                                break;
                }


        }
}
```

Output


Problems
Javadoc
Declaration
Console
<terminated> Question11 [Java Application] /Library/Java/JavaVirtu
Enter the type of the array:
Enter 1 for Integer
Enter 2 for Character
Enter 3 for String
Enter 4 for Double
1
Enter the size of the array
5
Enter the elements of the array
1 2 3 4 5
Printing the array in reverse order:
5 4 3 2 1


Problems
Javadoc
Declaration
Console
<terminated> Question11 [Java Application] /Library/Java/JavaV
Enter the type of the array:
Enter 1 for Integer
Enter 2 for Character
Enter 3 for String
Enter 4 for Double
2
Enter the size of the array
5
Enter the elements of the array
a b c d e
Printing the array in reverse order:
e d c b a

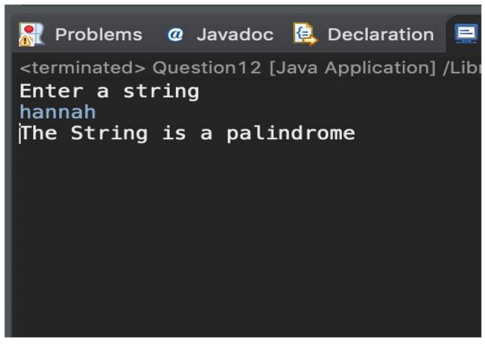
Question 12

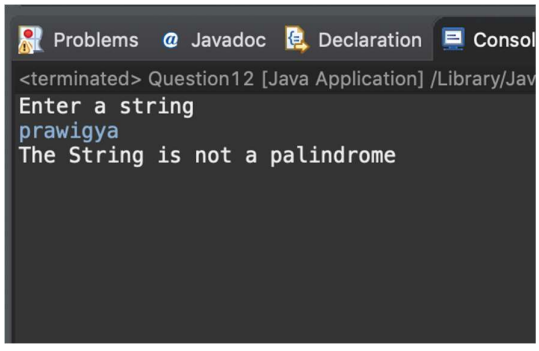
Write a Java program to check the given string is palindrome or not.

Code

```
import java.util.*;
public class Question12
{
	public static void main(String args[])
	{
		Scanner sc = new Scanner(System.in);
		System.out.println("Enter a string");
		String s= sc.nextLine();
		String s2="";
		//Reverse the string
		for(int i=0;i<s.length();i++)
		{
			s2=s.charAt(i)+s2;
		}
		if(s.compareTo(s2)==0)
			System.out.println("The String is a palindrome");
		else
			System.out.println("The String is not a palindrome");

	}

}
```

Output





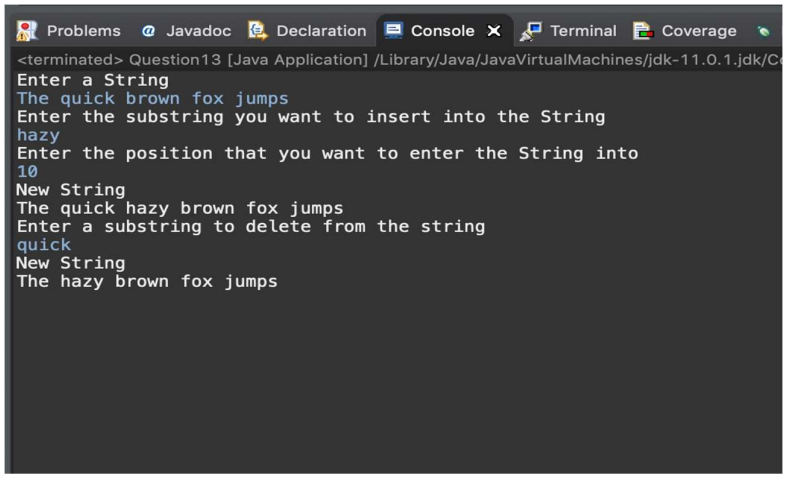
Question 13

Write a Java program to insert a string into another string and delete a substring from a string.

Code

```
import java.util.*;
public class Question13
{
	public static void main(String args[])
	{
		Scanner sc = new Scanner(System.in);
		System.out.println("Enter a String");
		String s = sc.nextLine();
		System.out.println("Enter the substring you want to insert into the String");
		String s1 = sc.nextLine();
		System.out.println("Enter the position that you want to enter the String into");
		int pos = sc.nextInt();
		//Enter the substring into the string
		String sub1="", sub2="";
		sub1 = s.substring(0,pos);
		sub2=s.substring(pos);
		s = sub1 + s1 + sub2;
		System.out.println("New String \n"+s);
		//Part 2
		sc.nextLine();
		System.out.println("Enter a substring to delete from the string");
		String s2= sc.nextLine();
		int pos2 = s.indexOf(s2);
		s = s.substring(0,pos2) + s.substring(pos2+s2.length());
		System.out.println("New String \n"+s);

	}
}
```

Output



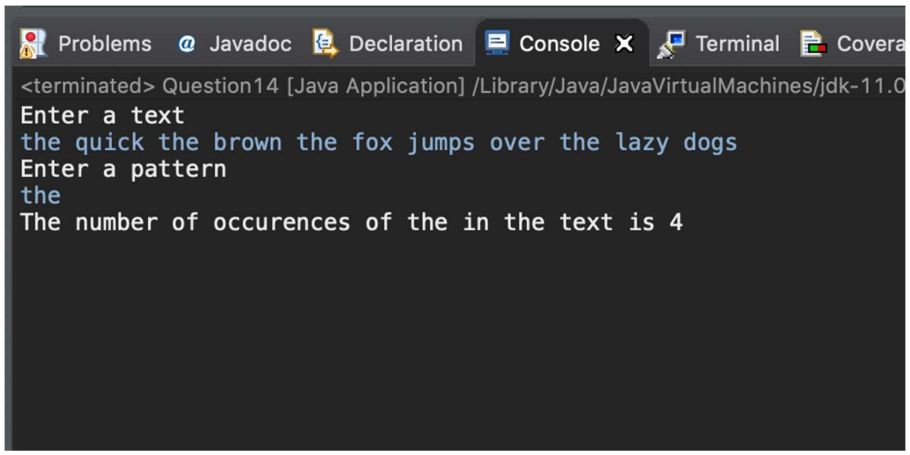
Question 14

Write a Java program to find out the number of occurrences of a pattern string in a given text.

Code

```
import java.util.*;
public class Question14
{
	public static void main(String args[])
	{
		Scanner sc = new Scanner(System.in);
		System.out.println("Enter a text");
		String s = sc.nextLine();
		//sc.nextLine();
		System.out.println("Enter a pattern ");
		String p = sc.nextLine();
		int c=0,pos=0;

		while(true)
		{
			pos = s.indexOf(p,pos);
			if(pos==-1)
				break;
			c+=1;
			pos+=1;

		}
		System.out.println("The number of occurences of "+p+" in the text is "+c);
	}
}
```

Output



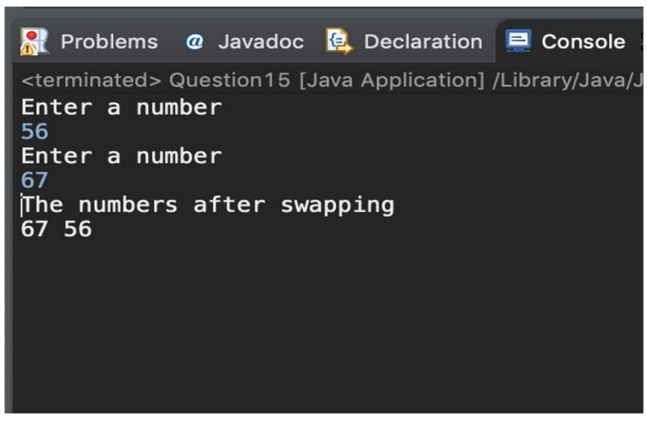
Question 15

Write a Java program to swap two values in a SWAP( ) method using wrapper classes.

Code

```
import java.util.*;
public class Question15 {
	int a;
	Question15()
	{
		a=0;
	}
	//swap 2 values in a method using wrapper class
	static void swap(Question15 ob1, Question15 ob2)
	{
		int temp = ob1.a;
		ob1.a = ob2.a;
		ob2.a = temp;
	}
	public static void main(String args[])
	{
		Scanner sc = new Scanner(System.in);
		System.out.println("Enter a number");
		Question15 ob1 = new Question15();
		ob1.a = sc.nextInt();
		System.out.println("Enter a number");
		Question15 ob2 = new Question15();
		ob2.a = sc.nextInt();
		swap(ob1, ob2);
		System.out.println("The numbers after swapping");
		System.out.println(ob1.a+" "+ob2.a);

	}
}
```

Output



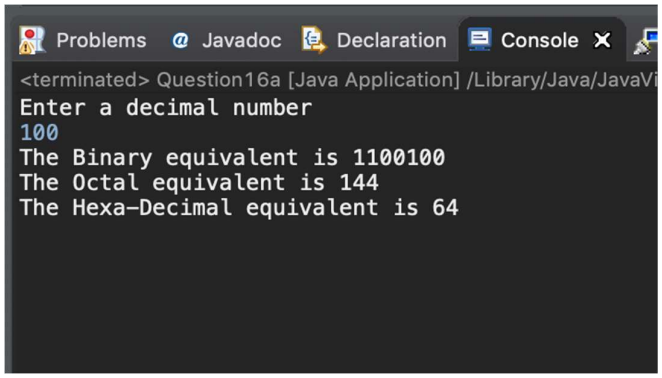
Question 16

Write a Java program to convert the decimal number to binary, octal, and hexadecimal
numbers using wrapper class methods. [Hint: Integer and Long classes]

Code

```
import java.util.*;
public class Question16a
{
	int dec, oct, hex;
	long bin;
	Question16a()
	{
		dec=0;
		oct=0;
		hex=0;
		bin=0;
	}
	static long decToBinary(int d)
	{
		long b = Long.parseLong(Integer.toBinaryString(d));
		return b;
	}

	static int decToOct(int d)
	{
		int a = Integer.parseInt(Integer.toOctalString(d));
		return a;
	}

	static int decToHex(int d)
	{
		int a = Integer.parseInt(Integer.toHexString(d));
		return a;
	}
	public static void main(String args[])
	{
		Scanner sc = new Scanner(System.in);
		System.out.println("Enter a decimal number");
		Question16a ob = new Question16a();
		ob.dec = sc.nextInt();
		ob.oct = decToOct(ob.dec);
		ob.hex = decToHex(ob.dec);
		ob.bin = decToBinary(ob.dec);
		System.out.println("The Binary equivalent is "+ob.bin);
		System.out.println("The Octal equivalent is "+ob.oct);
		System.out.println("The Hexa-Decimal equivalent is "+ob.hex);
	}

}
```

Output



Question 17

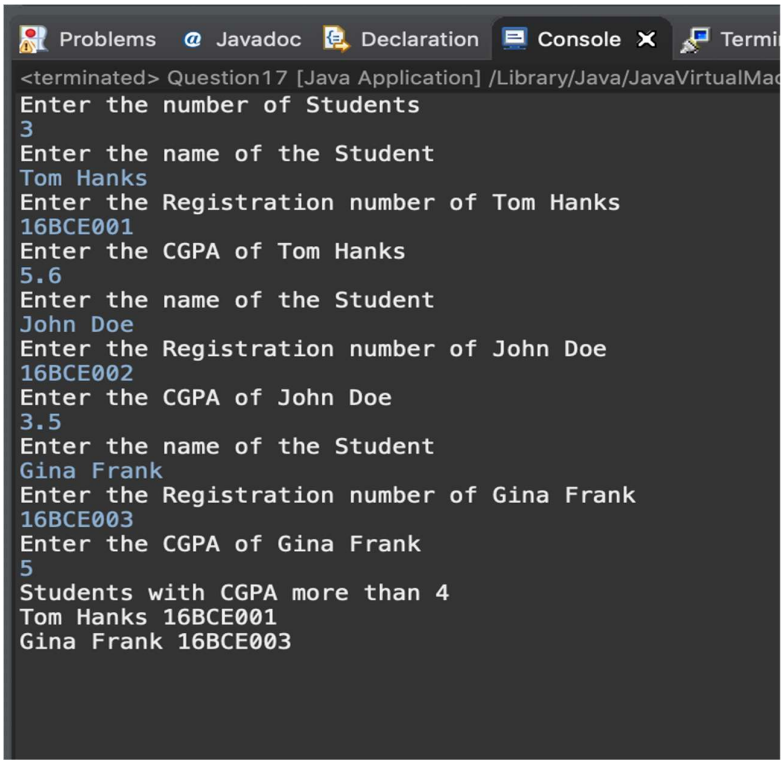
Write a class definition for ‘stu’ with name, regno, and cgpa values and required methods as members of the class. Create an array of objects of ‘stu’ for ‘n’ number of students in G2 slot. Write a Java program to display the name and registration numbers
of the students who have CGPA less than 4 in G2 slot.

Code

```
import java.util.*;
public class Question17
{
	String name, regno;
	double cgpa;
	Question17()
	{
		name = "";
		regno="";
		cgpa = 0.0;
	}
	void init(Question17 ob)
	{
		Scanner sc = new Scanner(System.in);
		System.out.println("Enter the name of the Student");
		ob.name= sc.nextLine();
		System.out.println("Enter the Registration number of "+ob.name);
		ob.regno = sc.nextLine();
		System.out.println("Enter the CGPA of "+ob.name);
		ob.cgpa = sc.nextDouble();

	}


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

```
		int n;
		Scanner sc = new Scanner(System.in);
		System.out.println("Enter the number of Students");
		n = sc.nextInt();

		Question17[] StudentArray = new Question17[n];
		int i;
		for(i = 0;i<n;i++)
		{
			StudentArray[i] = new Question17();
			StudentArray[i].init(StudentArray[i]);
		}

		System.out.println("Students with CGPA more than 4");
		for(i = 0;i<n;i++)
		{
			if(StudentArray[i].cgpa>4)
				System.out.println(StudentArray[i].name+" "+StudentArray[i].regno);
		}
	}
}
```

Output



Question 18

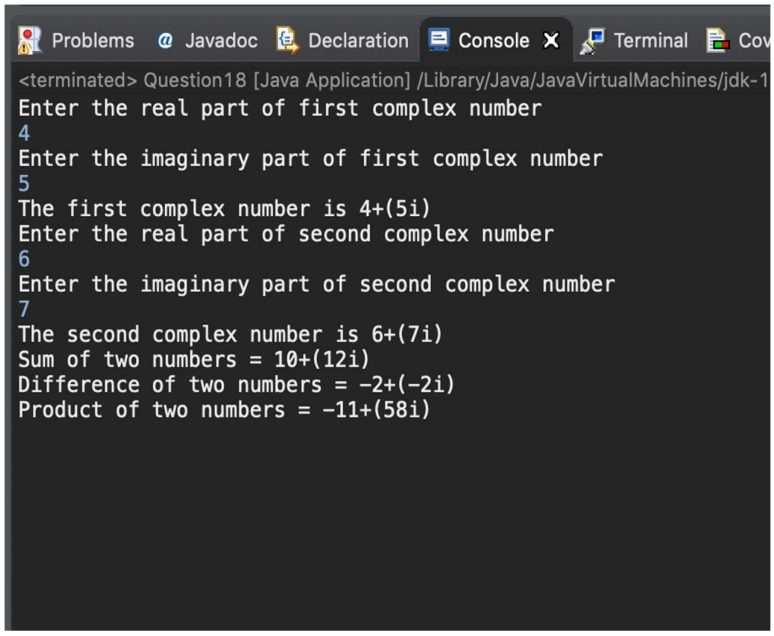
Write a Java program to implement complex number arithmetic using classes and use multiple constructors for initialising the complex numbers.

Code

```
import java.util.*;
public class Question18
{
	int real;
	int imag;
	Question18()
	{
		real = 0;
		imag = 0;
	}

	Question18(int real, int imag)
	{
		this.real = real;
		this.imag = imag;
	}
	public static void main(String args[])
	{
		Scanner sc = new Scanner(System.in);
		Question18 ob1 = new Question18();
		Question18 ob2 = new Question18();
		int r, i;
		System.out.println("Enter the real part of first complex number");
		r = sc.nextInt();
		System.out.println("Enter the imaginary part of first complex number");
		i = sc.nextInt();
		ob1 = new Question18(r,i);
		System.out.println("The first complex number is "+ob1.real+"+("+ob1.imag+"i)");

		System.out.println("Enter the real part of second complex number");
		r = sc.nextInt();
		System.out.println("Enter the imaginary part of second complex number");
		i = sc.nextInt();
		ob2 = new Question18(r,i);
		System.out.println("The second complex number is
"+ob2.real+"+("+ob2.imag+"i)");
		int tempr, tempi;
		//Adding the two numbers
		tempr = ob1.real + ob2.real;
		tempi = ob1.imag + ob2.imag;
		System.out.println("Sum of two numbers = "+tempr+"+("+tempi+"i)");
		//Subtracting the two numbers
		tempr = ob1.real - ob2.real;
		tempi = ob1.imag - ob2.imag;
		System.out.println("Difference of two numbers = "+tempr+"+("+tempi+"i)");
		//Multiplying the two numbers
```

```
        tempr = ob1.real*ob2.real - ob1.imag*ob2.imag;
        tempi = ob1.imag*ob2.real + ob1.real*ob2.imag;
        System.out.println("Product of two numbers = "+tempr+"+("+tempi+"i)");


    }
}
```

Output



Question 19

Write a Java program to print a pattern using a method PRINT( ) as follows:

```
*
**
***
****
*****
```

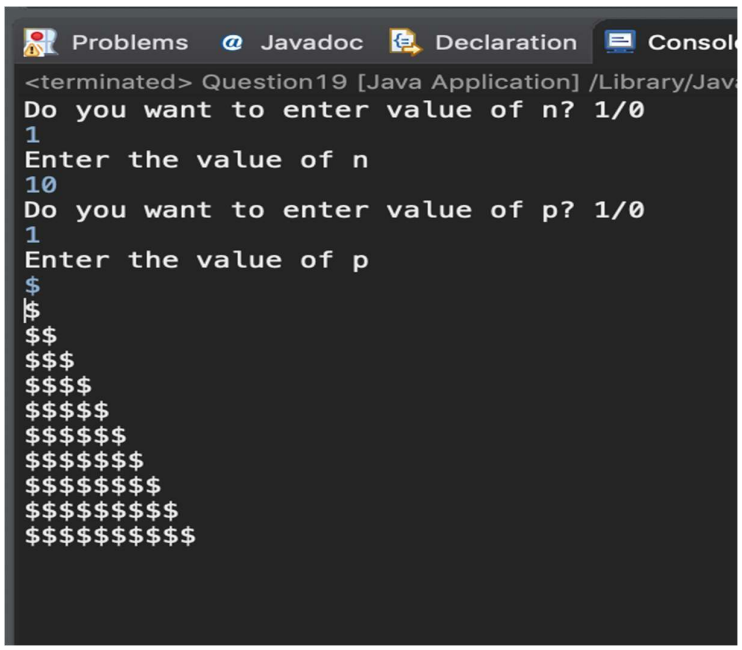
The type of the character and/or the number of lines to be printed can be taken as input from the user. The default values are '*' and 5. Using the concept of method overloading write different definitions for PRINT( ) with different argument list.

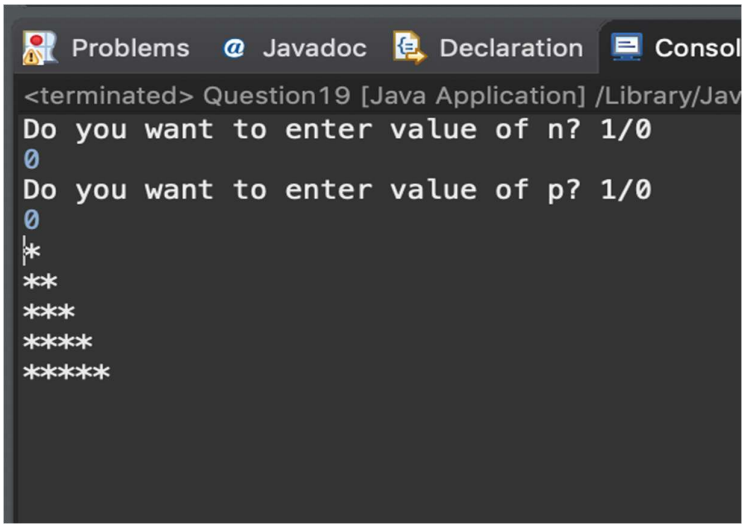
Code

```
import java.util.*;
public class Question19 {

	static void PRINT(char p, int n)
	{
		int i,j;
		for(i=1;i<=n;i++)
		{
			for(j=1;j<=i;j++)
				System.out.print(p);
			System.out.println();
		}
	}
	static void PRINT(char p)
	{
		int i, j;
		for(i=1;i<=5;i++)
		{
			for(j=1;j<=i;j++)
				System.out.print(p);
			System.out.println();
		}
	}
	static void PRINT(int n)
	{
		int i, j;
		for(i=1;i<=n;i++)
		{
			for(j=1;j<=i;j++)
				System.out.print('*');
			System.out.println();
		}
	}
	static void PRINT()
	{
		int i, j;
		for(i=1;i<=5;i++)
		{
```

```
                for(j=1;j<=i;j++)
                        System.out.print('*');
                System.out.println();
        }
    }
    public static void main(String args[])
    {
        Scanner sc = new Scanner(System.in);
        int n=0, ch;
        boolean nc=false,np=false;
        char p='-';
        System.out.println("Do you want to enter value of n? 1/0");
        ch=sc.nextInt();
        if(ch==1)
        {
                System.out.println("Enter the value of n");
                n=sc.nextInt();
                nc=true;
        }
        System.out.println("Do you want to enter value of p? 1/0");
        ch=sc.nextInt();
        if(ch==1)
        {
                System.out.println("Enter the value of p");
                p=sc.next().charAt(0);
                np=true;
        }
        if(nc && np)
                PRINT(p,n);
        else if(nc && !np)
                PRINT(n);
        else if(!nc && np)
                PRINT(p);
        else
                PRINT();


    }
}
```

Output


Problems
Javadoc
Declaration
Consol
<terminated> Question19 [Java Application] /Library/Jav
Do you want to enter value of n? 1/0
1
Enter the value of n
10
Do you want to enter value of p? 1/0
1
Enter the value of p
$
$$
$$$
$$$$
$$$$$
$$$$$$
$$$$$$$
$$$$$$$$
$$$$$$$$$
$$$$$$$$$$


Problems
Javadoc
Declaration
Consol
<terminated> Question19 [Java Application] /Library/Jav
Do you want to enter value of n? 1/0
0
Do you want to enter value of p? 1/0
0
*
**
***
****
*****

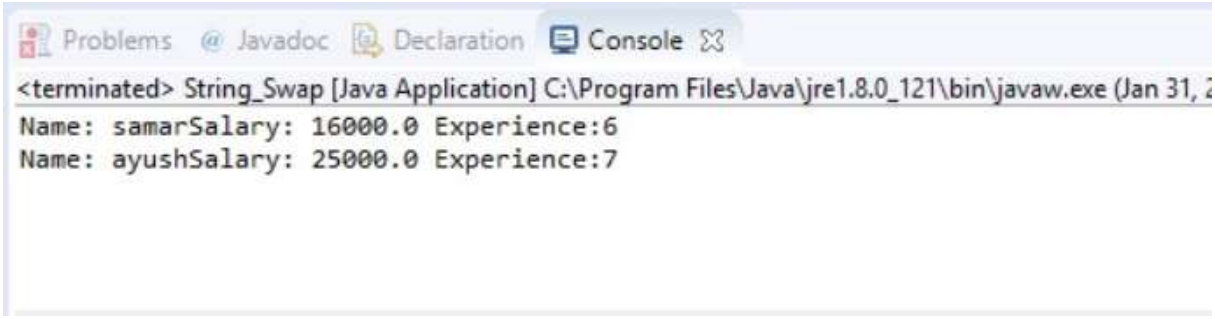
Question 21

With the existing abstract class ‘Employee’ derive another class called ‘Developer’ with required specifications. Create an array of ‘Java_Developer’ objects of size ‘n’. For the Java_Developers who have more than 5 years of experience give an increment of 10000INR. Write a Java program to test this and display the details of the employees who got the increment.

```
import java.util.*;
import java.lang.*;

abstract class Employee{
        String name;
        float salary;
        int experience;
        int getExperience();
        float getsalary();
}

class Java_developer extends Employee{
   Java_developer(String n, float s, int exp){
        name = n;
        experience = exp;
        if (exp>5) {
                salary = s+ 5000;}
        else
                salary = s;
   }
        int getExperience() {
                return experience;
        }
        float getsalary() {
                return salary;
        }
}

public class String_Swap {
        public static void main(String args[]) {
                Java_developer jv[] = new Java_developer[3]; // to test
                jv[0] = new Java_developer("Raj",5000,3);
                jv[1] = new Java_developer("samar",11000,6);
                jv[2] = new Java_developer("ayush",20000,7);

                for ( int i=0;i<3;i++) {
                        if (jv[i].getExperience()>5) {
                                System.out.println("Name: "+ jv[i].name + "Salary: "+ jv[i].salary + "
Experience:" + jv[i].getExperience());

                        }
                }
```

```
        }
}
```

Output



Question 22

Assume you have a class 'Vehicle' with all basic information and a method to display its details. Using the class create new classes like Bike, Car, Bus, and Truck with their own specific information. A discount in the road tax is allowed for all the vehicle which are purchased in the year 2018 and later. Redefine the display method in the new classes to display updated details.

```
import java.io.*;
import java.util.*;
class Vehicle
{
   int maxSpeed = 120;
   String use="Petrol";

}


class Bike extends Vehicle
{
   String type="bike";
   int wheels=2;
   String manufacturer="Honda";
   int year;
   void display()
   {
     System.out.println("Maximum Speed: " + super.maxSpeed+" use: "+super.use);
     System.out.println("type= "+type+" "+"wheels= "+wheels+" manufacturer= "+manufacturer);
     if(year>2018)
     {
           System.out.println("new car discount on road tax");
     }
     else
```

```
    {
        System.out.println("old car road tax");
    }
  }
}

class Car extends Vehicle
{
  String type="car";
  int wheels=4;
  String manufacturer="Tesla";
  int year;
  void display()
  {
    System.out.println("Maximum Speed: " + super.maxSpeed+" use: "+super.use);
    System.out.println("type= "+type+" "+"wheels= "+wheels+" manufacturer= "+manufacturer);
    if(year>2018)
    {
        System.out.println("new bike discount on road tax");
    }
    else
    {
        System.out.println("old bike road tax");
    }
  }
}

class Truck extends Vehicle
{
  String type="truck";
  int wheels=8;
  String manufacturer="TATA";
  int year;
  void display()
  {
    System.out.println("Maximum Speed: " + super.maxSpeed+" use: "+super.use);
    System.out.println("type= "+type+" "+"wheels= "+wheels+" manufacturer= "+manufacturer);
    if(year>2018)
    {
        System.out.println("new truck discount on road tax");
    }
    else
    {
        System.out.println("old truck road tax");
    }
  }
}

class Bus extends Vehicle
{
  String type="bus";
  int wheels=6;
```

```
    String manufacturer="Ashok Layland";
    int year;
    void display()
    {
      System.out.println("Maximum Speed: " + super.maxSpeed+" use: "+super.use);
      System.out.println("type= "+type+" "+"wheels= "+wheels+" manufacturer= "+manufacturer);
      if(year>2018)
      {
            System.out.println("new bus discount on road tax");
      }
      else
      {
            System.out.println("old bus road tax");
      }
    }
}


class q21
{
    public static void main(String[] args)
    {
          Scanner in=new Scanner(System.in);
        Bus small = new Bus();
        System.out.println("enter the purchase year");
        small.year=in.nextInt();
        small.display();

    }
}
```

Output

```
enter the purchase year
2020
Maximum Speed: 120 use: Personal
type= bus wheels= 6 manufacturer= Ashok Layland
new bus discount on road tax
```