काशी हिन्दू विश्वविद्यालय BANARAS HINDU UNIVERSITY

Object Oriented Programming through JAVA

[Lab Assignment]

[CS-206]

MASTER OF COMPUTER APPLICATION (MCA)

DEPARTMENT OF COMPUTER SCIENCE

BANARAS HINDU UNIVERSITY

RAJIV GANDHI SOUTH CAMPUS

Submitted by

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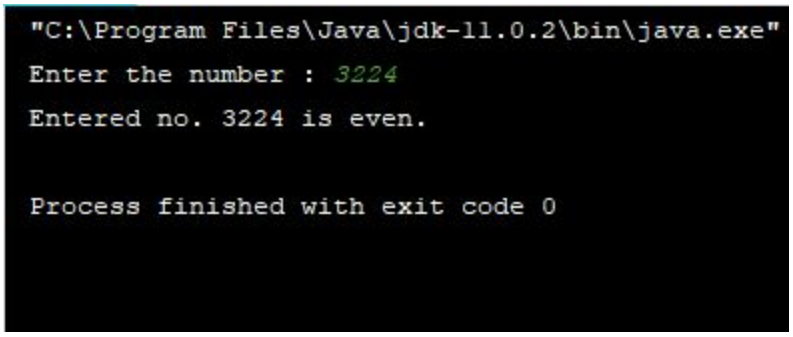
1. Java Program to Check Even or Odd Number

```java
//Java Program to Check Even or Odd Number

import java.util.Scanner;

public class Task1 {
   public static void main(String[] args) {
       Scanner sc = new Scanner(System.in);
       System.out.print("Enter the number : ");
       int n = sc.nextInt();
       if(n%2 == 0)
           System.out.println("Entered no. " + n + " is even.");
       else
           System.out.println("Entered no. " + n + " is odd.");
   }
}
```

Output :



2. Java Program to add two binary numbers

```java
// Java Program to add two binary numbers

import java.util.Scanner;

public class Task2 {
   public static void main(String[] args) {
       Scanner sc = new Scanner(System.in);
       System.out.println("Enter two binary number : ");
       long b1 = sc.nextLong();
       long b2 = sc.nextLong();
       int i = 0, carry = 0;
       int[] sum = new int[10];
       long  temp1 = b1;
       long temp2 = b2;
       while (b1 != 0 || b2 != 0)
       {
           sum[i++] = (int)((b1 % 10 + b2 % 10 + carry) % 2);
           carry = (int)((b1 % 10 + b2 % 10 + carry) / 2);
           b1 = b1 / 10;
           b2 = b2 / 10;
       }
       if (carry != 0) {
           sum[i++] = carry;
       }
       --i;
       System.out.print("Sum of binary numbers "+temp1+" and "+temp2+" is : ");
       while (i >= 0) {
           System.out.print(sum[i--]);
       }
   }
}
```

Output :

```
Enter two binary number :
1011101
1101101
Sum of binary numbers 1011101 and 1101101 is : 11001010
Process finished with exit code 0
```

3. Java Program to add two complex numbers

```
//Java Program to add two complex numbers

import java.util.Scanner;

class ComplexNumber {
   double real;
   double img;
   ComplexNumber(double real, double img) {
       this.real = real;
       this.img = img;
   }
   public static ComplexNumber addComplex(ComplexNumber c1, ComplexNumber c2) {
       ComplexNumber temp = new ComplexNumber(0,0);
       temp.real = c1.real + c2.real;
       temp.img = c1.img + c2.img;
       return temp;
   }
}
public class Task3 {
   public static void main(String[] args) {
       Scanner scanner = new Scanner(System.in);
       System.out.print("Enter first complex number : ");
       ComplexNumber c1 = new ComplexNumber(scanner.nextFloat(),
scanner.nextFloat());
       System.out.print("Enter second complex number : ");
       ComplexNumber c2 = new ComplexNumber(scanner.nextFloat(),
scanner.nextFloat());
       ComplexNumber temp = ComplexNumber.addComplex(c1,c2);
       System.out.print("The sum of complex numbers  "+c1.real+" + "+c1.img+"i  and
"+c2.real+" + "+c2.img+"i  is : ");
       System.out.print(temp.real+" + "+temp.img+"i");
   }
}
```

Output :

```
Enter first complex number : 4.5 74
Enter second complex number : -24 21
The sum of complex numbers  4.5 + 74.0i  and  -24.0 + 21.0i  is : -19.5 + 95.0i
Process finished with exit code 0
```

4. Java Program to check Leap Year

```java
//Java Program to check Leap Year

import java.util.Scanner;

public class Task4 {
   public static void main(String[] args) {
       Scanner sc = new Scanner(System.in);
       System.out.println("Enter the year : ");
       int n = sc.nextInt();
       if(n%400 == 0)
           System.out.println(n + " is a leap year.");
       else if(n%4 == 0 && n%100 != 0)
           System.out.println(n + " is a leap year.");
       else
           System.out.println(n + " is not a leap year." );
   }
}
```

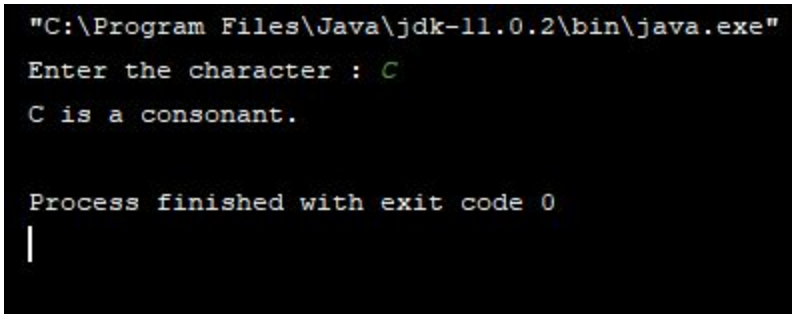
Output :

```
"C:\Program Files\Java\jdk-11.0.2\bin\java.exe"
Enter the year :
2250
2250 is not a leap year.

Process finished with exit code 0
```

5. Java Program to check whether input character is vowel or consonant

```
//Java Program to check whether input character is vowel or consonant

import java.util.Scanner;

public class Task5 {
   public static void main(String[] args) {
       Scanner sc = new Scanner(System.in);
       System.out.print("Enter the character : ");
       char ch = sc.next().charAt(0);
       if((65 <= ch && ch <= 90) || (97 <= ch && ch <= 122)) {
           if (ch == 'a' || ch == 'A' || ch == 'e' || ch == 'E' || ch == 'i' || ch
== 'I' || ch == 'o' || ch == 'O' || ch == 'u' || ch == 'U')
               System.out.println(ch + " is a vowel.");
           else
               System.out.println(ch + " is a consonant.");
       } else
           System.out.println(ch + " is not an alphabet.");
   }
}
```

Output:



6. Java Program to calculate compound interest

```java
//Java Program to calculate compound interest

import java.util.Scanner;

public class Task6 {
   public static void main(String[] args) {
       Scanner sc = new Scanner(System.in);
       System.out.print("Enter the principal amount : ");
       double p = sc.nextFloat();
       System.out.print("Enter the interest rate (Quarterly) : ");
       double r = sc.nextFloat();
       System.out.print("Enter the time span in quarter : ");
       double t = sc.nextFloat();
       double ci = CI(p, r, t);
       System.out.println("The compound interest for entered details is : " +CI(p,
r, t));
   }

   private static double CI(double p, double r, double t) {
       double a = p*Math.pow((100+r)/100, t);
       return a-p;
   }
}
```

Output :

```
Enter the principal amount : 10000
Enter the interest rate (Quarterly) : 5
Enter the time span in quarter : 12
The compound interest for entered details is : 7958.563260221301

Process finished with exit code 0
```

7. Java Program to find quotient and remainder

```java
//Java Program to find quotient and remainder

import java.util.Scanner;

public class Task7 {
   public static void main(String[] args) {
       Scanner sc = new Scanner(System.in);
       System.out.print("Enter the number : ");
       int number = sc.nextInt();
       System.out.print("Enter the dividend : ");
       int dividend = sc.nextInt();

       System.out.print("The quotient is " + number/dividend + " and the remainder
is " + number%dividend + ".");

   }
}
```

Output :

```
Enter the number : 65
Enter the dividend : 9
The quotient is 7 and the remainder is 2.
Process finished with exit code 0
```

8. Java Program to calculate power of a number

```java
//Java Program to calculate power of a number

import java.util.Scanner;

public class Task8 {
   public static void main(String[] args) {
       Scanner scanner = new Scanner(System.in);
       System.out.print("Enter the number : ");
       double number = scanner.nextFloat();
       System.out.print("Enter the power : ");
       int power = scanner.nextInt();
       double result = pow(number, power);
       System.out.print("The result is : " + result);
   }
   public static double pow(double number, int power) {
       double res = 1;
       for(int i = 0; i< power; i++) {
           res = res*number;
       }
       return res;
   }
}
```

Output :

```
Enter the number : 32
Enter the power : 4
The result is : 1048576.0
Process finished with exit code 0
```

9. Java Program to Convert char to String and String to Char

```
//Java Program to Convert char to String and String to Char

import java.util.Scanner;

public class Task9 {
   public static void main(String[] args) {
       Scanner scanner = new Scanner(System.in);
       System.out.println("Enter a char : ");
       char ch = scanner.next().charAt(0);
       System.out.println("The string value of character "+ch+" is :
"+charToString(ch));
       Scanner sc = new Scanner(System.in);
       System.out.println("Enter a string : ");
       String str = sc.nextLine();
       System.out.println("The characters in string "+str+" are : ");
       stringToChar(str);
   }
   public static String charToString(char ch) {
       return String.valueOf(ch);
   }
   public static void stringToChar(String str) {
       char[] ch = new char[str.length()];
       for (int i = 0; i < str.length(); i++) {
           ch[i] = str.charAt(i);
       }
       for (char c : ch) {
           System.out.println(c);
       }
   }
}
```

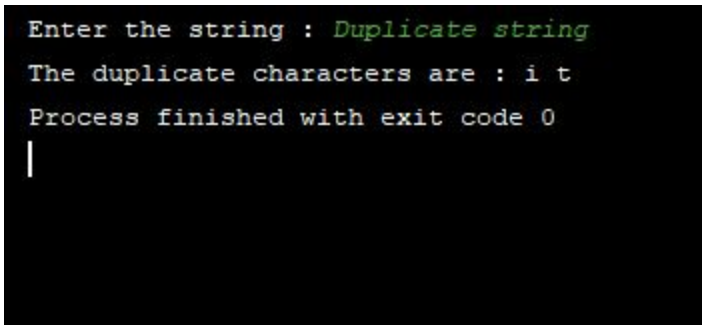
Output :

```
Enter a char :
c
The string value of character c is : c
Enter a string :
java
The characters in string java are :
j
a
v
a
```

10. Java Program to find duplicate characters in a String

```java
//Java Program to find duplicate characters in a String

import java.util.Scanner;

public class Task10 {
   public static void main(String[] args) {
       Scanner scanner = new Scanner(System.in);
       System.out.print("Enter the string : ");
       String str = scanner.nextLine();
       System.out.print("The duplicate characters are : ");
       findDupli(str);
   }
   public static void findDupli(String str) {
       char[] ch = str.toCharArray();
       int count = 0;
       for(int i = 0; i<str.length();i++) {
           for (int j = i+1; j < str.length(); j++) {
               if(ch[i]==ch[j]) {
                   count++;
                   System.out.print(ch[j]+" ");
               }
           }
       }
       if(count==0)
           System.out.print("No characters are repeated.");
   }
}
```

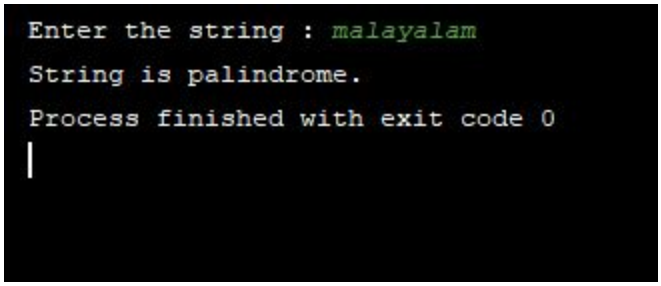
Output :



11. Java Program to check Palindrome String

```java
//Java Program to check Palindrome String

import java.util.Scanner;

public class Task11 {
   public static void main(String[] args) {
       Scanner scanner = new Scanner(System.in);
       System.out.print("Enter the string : ");
       String str = scanner.nextLine();
       boolean flag = false;
       for (int i = 0; i < str.length()/2; i++) {
           if(str.charAt(i) == str.charAt(str.length()-i-1))
               flag = true;
           else
               flag = false;
       }
       if (flag)
           System.out.print("String is palindrome.");
       else
           System.out.print("Not palindrome.");
   }
}
```

Output :



12. Java Program to sort strings in alphabetical order

```java
//Java Program to sort strings in alphabetical order

import java.util.Scanner;

public class Task12 {
   public static void main(String[] args) {
       Scanner scanner1 = new Scanner(System.in);
       System.out.print("Enter the no. of strings : ");
       int n = scanner1.nextInt();
       String[] str = new String[n];
       System.out.println("Enter the strings : ");
       Scanner scanner = new Scanner(System.in);
       for(int i = 0; i < n; i++) {
           str[i] = scanner.nextLine();
       }
       System.out.println("The sorted strings are : ");
       sort(str);
   }
   public static void sort(String[] str) {
       for (int i = 0; i < str.length; i++) {
           for (int j = 1; j < str.length; j++) {
               if(str[j-1].compareTo(str[j])>0) {
                   String temp = str[j-1];
                   str[j-1] = str[j];
                   str[j] = temp;
               }
           }
       }
       for (String s : str) {
           System.out.println(s);
       }
   }
}
```

Output :

```
Enter the no. of strings : 4
Enter the strings :
window
refactor
tools
navigate
The sorted strings are :
navigate
refactor
tools
window
```

13. Java Program to reverse words in a String

```
//Java Program to reverse words in a String

import java.util.Scanner;

public class Task13 {
   public static void main(String[] args) {
       Scanner scanner = new Scanner(System.in);
       System.out.println("Enter the string : ");
       String str = scanner.nextLine();
       reversedWord(str);
   }
   public static void reversedWord(String str) {
       String[] words = str.split(" ");
       String reversedString = "";
       for (String word : words) {
           String reverseWord = "";
           for (int j = word.length() - 1; j >= 0; j--) {
               reverseWord = reverseWord + word.charAt(j);
           }
           reversedString = reversedString + reverseWord + " ";
       }
       System.out.println("Reversed words in string "+str+" are :
"+reversedString);
   }
}
```

Output :

```
Enter the string :
This is Java Lab Assignment
Reversed words in string This is Java Lab Assignment are : sihT si avaJ baL tnemngissA

Process finished with exit code 0
```

14. Java Program to perform bubble sort on Strings

```java
//Java Program to perform bubble sort on Strings

import java.util.Scanner;

public class Task14 {
   public static void main(String[] args) {
       Scanner scanner = new Scanner(System.in);
       System.out.println("Enter the no. of strings : ");
       int n = scanner.nextInt();
       String[] str = new String[n];
       Scanner scanner1 = new Scanner(System.in);
       System.out.println("Enter Strings : ");
       for(int i = 0; i<n; i++) {
           str[i] = scanner1.nextLine();
       }
       for (int i = 0; i < n; i++) {
           for (int j = 1; j < n; j++) {
               if(str[j-1].compareToIgnoreCase(str[j])>0) {
                   String temp = str[j-1];
                   str[j-1] = str[j];
                   str[j] = temp;
               }
           }
       }
       System.out.println("Sorted strings are : ");
       for (String s : str) {
           System.out.println(s+" ");
       }
   }
}
```

Output :

```
Enter the no. of strings :
3
Enter Strings :
navigate
view
code
Sorted strings are :
code
navigate
view
```

15. Java program to find occurrence of a character in a String

```java
//Java program to find occurrence of a character in a String

import java.util.Scanner;

public class Task15 {
   public static void main(String[] args) {
       Scanner scanner = new Scanner(System.in);
       System.out.println("Enter the string : ");
       String str = scanner.nextLine();
       countCharacter(str);
   }
   public static void countCharacter(String str) {
       int[] counter = new int[256];
       int len = str.length();
       for (int i = 0; i < len; i++)
           counter[str.charAt(i)]++;
       char[] array = new char[str.length()];
       for (int i = 0; i < len; i++) {
           array[i] = str.charAt(i);
           int flag = 0;
           for (int j = 0; j <= i; j++) {
               if (str.charAt(i) == array[j])
                   flag++;
           }
           if (flag == 1)
               System.out.println("Occurrence of char " + str.charAt(i)
                       + " in the String is:" + counter[str.charAt(i)]);
       }
   }
}
```

Output :

```
Enter the string :
Assignment
Occurrence of char A in the String is:1
Occurrence of char s in the String is:2
Occurrence of char i in the String is:1
Occurrence of char g in the String is:1
Occurrence of char n in the String is:2
Occurrence of char m in the String is:1
Occurrence of char e in the String is:1
Occurrence of char t in the String is:1
```

16. Java program to count vowels and consonants in a String

```
//Java program to count vowels and consonants in a String

import java.util.Scanner;

public class Task16 {
   public static void main(String[] args) {
       Scanner scanner = new Scanner(System.in);
       System.out.print("Enter the string : ");
       String str = scanner.nextLine();
       int cVowel = 0;
       int cConsonant = 0;
       for(int i = 0; i<str.length(); i++) {
           char ch = str.charAt(i);
           if(ch == 'a' || ch == 'A' || ch == 'e' || ch == 'E' || ch == 'i' || ch
== 'I' ||ch == 'o' || ch == 'O' || ch == 'u' || ch == 'U')
               cVowel++;
           else
               cConsonant++;
       }
       System.out.print("String '" + str+"' has " + cVowel + " vowels and " +
cConsonant + " consonant.");
   }
}
```

Output :

```
Enter the string : JavaLabAssignment
String 'JavaLabAssignment' has 6 vowels and 11 consonant.
Process finished with exit code 0
```

17. Java Program to Calculate average of numbers using Array

```java
//Java Program to Calculate average of numbers using Array

import java.util.Scanner;

public class Task17 {
   public static void main(String[] args) {
       Scanner scanner = new Scanner(System.in);
       System.out.print("Enter the length of array : ");
       int n = scanner.nextInt();
       double[] arr = new double[n];
       System.out.print("Enter the values : ");
       for (int i = 0; i < arr.length; i++) {
           arr[i] = scanner.nextFloat();
       }
       double sum = 0;
       for(int i = 0 ; i < arr.length ; i++) {
           sum = sum + arr[i];
       }
       double avg = sum/n;
       System.out.print("Average of entered value is : " + avg);
   }
}
```

Output :

```
Enter the length of array : 4
Enter the values : 43
54
67
44
Average of entered value is : 52.0
Process finished with exit code 0
```

18. Java Program to Add the elements of an Array

```java
//Java Program to Add the elements of an Array

import java.util.Scanner;

public class Task18 {
   public static void main(String[] args) {
       Scanner scanner = new Scanner(System.in);
       System.out.print("Enter the length of array : ");
       int n = scanner.nextInt();
       double[] arr = new double[n];
       System.out.print("Enter the elements of array : ");
       for (int i = 0; i < n; i++) {
           arr[i] = scanner.nextFloat();
       }
       double sum = 0;
       for(int i =0; i<n;i++) {
           sum = sum + arr[i];
       }
       System.out.print("The sum of elements of array is : " + sum);
   }
}
```

Output :

```
Enter the length of array : 4
Enter the elements of array : 434 546 12 5
The sum of elements of array is : 997.0
Process finished with exit code 0
```

19. Java Program to reverse an array

```java
//Java Program to reverse an array

import java.util.Scanner;

public class Task19 {
   public static void main(String[] args) {
       Scanner scanner = new Scanner(System.in);
       System.out.println("Enter the length of array : ");
       int n = scanner.nextInt();
       int[] array = new int[n];
       System.out.println("Enter the elements : ");
       for (int i = 0; i < n; i++) {
           array[i] = scanner.nextInt();
       }
       System.out.println("Reversed array is : ");
       reverseArray(array);
   }
   public static void reverseArray(int[] arr) {
       int j = arr.length-1;
       int i = 0;
       int temp = 0;
       while(i<j)
       {
           temp = arr[i];
           arr[i] = arr[j];
           arr[j] = temp;
           i++;
           j--;
       }
       for (int k : arr) {
           System.out.println(k+" ");
       }
   }
}
```

Output :

```
Enter the length of array :
4
Enter the elements :
12
353
23
1
Reversed array is :
1
23
353
12
```

20. Java Program to sort an array in ascending order

```java
//Java Program to sort an array in ascending order

import java.util.Scanner;

public class Task20 {
   public static void main(String[] args) {
       Scanner scanner = new Scanner(System.in);
       System.out.println("Enter the length of array : ");
       int n = scanner.nextInt();
       int[] arr = new int[n];
       System.out.println("Enter the elments : ");
       for (int i = 0; i < n; i++) {
           arr[i] = scanner.nextInt();
       }
       System.out.println("Array in ascending order : ");
       sortAsc(arr);
   }
   public static void sortAsc(int[] arr) {
       for (int i = 0; i < arr.length; i++) {
           for (int j = i+1; j < arr.length; j++) {
               if(arr[i] > arr[j]) {
                   int temp = arr[i];
                   arr[i] = arr[j];
                   arr[j] = temp;
               }
           }
       }
       for(int x : arr) {
           System.out.println(x);
       }
   }
}
```

Output :

```
Enter the length of array :
4
Enter the elments :
121
43
562
322
Array in ascending order :
43
121
322
562
```

21. Java Program to convert char Array to String

```java
//Java Program to convert char Array to String

import java.util.Scanner;

public class Task21 {
   public static void main(String[] args) {
       Scanner scanner = new Scanner(System.in);
       char[] ch;
       System.out.print("Enter length of array : ");
       int n = scanner.nextInt();
       ch = new char[n];
       System.out.println("Enter characters : ");
       for (int i = 0; i < n; i++) {
           ch[i] = scanner.next().charAt(0);
       }
       String str = "";
       for (int i = 0; i < n; i++) {
           str = str+ch[i];
       }
       System.out.println("Entered string is : "+str);
   }
}
```

Output :

```
Enter length of array : 5
Enter characters :
a
d
g
e
y
Entered string is : adgey
```

22. Java Program to Add Two Matrix Using Multi-dimensional Arrays

```
//Java Program to Add Two Matrix Using Multi-dimensional Arrays
import java.util.Scanner;
public class Task22 {
   public static void main(String[] args) {
       Scanner scanner = new Scanner(System.in);
       System.out.print("Enter the dimensions of first matrix : ");
       int rowMatrixOne = scanner.nextInt();
       int columnMatrixOne = scanner.nextInt();
       System.out.print("Enter the dimensions for second matrix : ");
       int rowMatrixTwo = scanner.nextInt();
       int columnMatrixTwo = scanner.nextInt();
       if(rowMatrixOne == rowMatrixTwo && columnMatrixOne == columnMatrixTwo) {
           System.out.print("Enter the elements of first array : ");
           int[][] matrixOne = new int[rowMatrixOne][columnMatrixOne];
           for(int i=0; i<rowMatrixOne; i++) {
               for(int j=0; j<columnMatrixOne; j++) {
                   matrixOne[i][j] = scanner.nextInt();
               }
           }
           System.out.print("Enter the elements of second array : ");
           int[][] matrixTwo = new int[rowMatrixTwo][columnMatrixTwo];
           for(int i=0; i<rowMatrixTwo; i++) {
               for(int j=0; j<columnMatrixTwo; j++) {
                   matrixTwo[i][j] = scanner.nextInt();
               }
           }
           int[][] resultMatrix = new int[rowMatrixOne][columnMatrixOne];
           for(int i=0; i<rowMatrixOne; i++) {
               for(int j=0; j<columnMatrixOne; j++) {
                   resultMatrix[i][j] = matrixOne[i][j] + matrixTwo[i][j];
               }
           }
           for (int i = 0; i< rowMatrixOne; i++) {
               for (int j = 0; j < columnMatrixOne; j++) {
                   System.out.print(resultMatrix[i][j] + " ");
               }
               System.out.println();
           }
       }
       else
           System.out.print("Matrices can't be added as dimensions are not same.");
   }
}
```

Output :

```
Enter the dimensions of first matrix : 2 2
Enter the dimensions for second matrix : 2 2
Enter the elements of first array : 12 34 45 65
Enter the elements of second array : 323 657 53 21
335 691
98 86
```

23. Java Program to Reverse a number using for, while loop and recursion

```
//Java Program to Reverse a number using for, while loop and recursion
import java.util.Scanner;
public class Task23 {
   public static void main(String[] args) {
       Scanner scanner = new Scanner(System.in);
       System.out.println("Enter the number : ");
       int n = scanner.nextInt();
       System.out.println("The reverse of number "+n+" using while loop is :
"+reverseWhile(n));
       System.out.println("The reverse of number "+n+" using for loop is :
"+reverseFor(n));
       System.out.print("The reverse of number "+n+" using recursion is : ");
       reverseRecursion(n);
   }
   public static int reverseWhile(int n) {
       int reverse = 0;
       while( n != 0 )
       {   reverse = reverse * 10;
           reverse = reverse + n%10;
           n = n/10;
       }
       return reverse;
   }
   public static int reverseFor(int n) {
       int reverse = 0;
       for( ;n != 0; n/=10)
       {   reverse = reverse * 10;
           reverse = reverse + n%10;
       }
       return reverse;
   }
   public static void reverseRecursion(int n) {
       if (n < 10) {
           System.out.print(n);
           return ;
       } else {
           System.out.print(n % 10);
           reverseRecursion(n / 10);
       }
   }
}
```

Output :

```
Enter the number :
24234
The reverse of number 24234 using while loop is : 43242
The reverse of number 24234 using for loop is : 43242
The reverse of number 24234 using recursion is : 43242
Process finished with exit code 0
```

24. Java Program to check Palindrome string using Recursion

```java
//Java Program to check Palindrome string using Recursion

import java.util.Scanner;

public class Task24 {
   public static void main(String[] args) {
       Scanner scanner = new Scanner(System.in);
       System.out.print("Enter String : ");
       String str = scanner.nextLine();
       if(isPalindrome(str))
           System.out.print("The string is palindrome.");
       else
           System.out.print("The string isn't palindrome.");
   }
   public static boolean isPalindrome(String str) {
       if(str.length() == 0 || str.length() == 1)
           return true;
       if(str.charAt(0)==str.charAt(str.length()-1))
           return isPalindrome(str.substring(1,str.length()-1));
       return false;
   }
}
```

Output :

```
Enter String : palindrome
The string isn't palindrome.
Process finished with exit code 0
```

25. Java Program to Reverse a String using Recursion

```java
//Java Program to Reverse a String using Recursion

import java.util.Scanner;

public class Task25 {
   public static void main(String[] args) {
       System.out.print("Enter the string : ");
       Scanner scanner = new Scanner(System.in);
       String str = scanner.nextLine();
       System.out.print("Reverse of string "+str+" is : "+reverseString(str));
   }
   public static String reverseString(String str) {
       if( str.isEmpty()) {
           System.out.print("String is empty.");
           return str;
       }
       else
           return reverseString(str.substring(1))+str.charAt(0);
   }
}
```

Output :

```
Enter the string : JavaLabManual
String is empty.Reverse of string JavaLabManual is : launaMbaLavaJ
Process finished with exit code 0
```

26. Java Program to find Factorial of a number using Recursion

```java
//Java Program to find Factorial of a number using Recursion

import java.util.Scanner;

public class Task26 {
   public static void main(String[] args) {
       Scanner scanner = new Scanner(System.in);
       System.out.print("Enter the digit : ");
       int n = scanner.nextInt();
       int result = fact(n);
       System.out.println("The factorial of "+n+" is : "+result);
   }
   public static int fact(int digit) {
       if(digit==0 || digit == 1)
           return 1;
       return digit*fact(digit-1);
   }
}
```

Output :

```
Enter the digit : 6
The factorial of 6 is : 720

Process finished with exit code 0
```

27. Java Program to display first 100 prime numbers

```
//Java Program to display first 100 prime numbers

public class Task27 {
   public static void main(String[] args) {
       int count = 0;
       int i = 2;
       while(count < 100) {
           if(isPrime(i)) {
               System.out.print(i + " ");
               count++;
           }
           i++;
       }
   }
   public static boolean isPrime(int n) {
       int flag = 0;
       for(int i = 1; i<n ; i++) {
           if(n%i == 0)
               flag++;
       }
       if(flag == 1)
           return true;
       else
           return false;
   }
}
```

Output :

```
 2 3 5 7 11 13 17 19 23 29 31 37 41 43 47 53 59 61 67 71
 Process finished with exit code 0
```

```
71 73 79 83 89 97 101 103 107 109 113 127 131 137 139 149 151 157 163 167
```

```
173 179 181 191 193 197 199 211 223 227 229 233 239 241 251 257 263 269 271
```

```
277 281 283 293 307 311 313 317 331 337 347 349 353 359 367 373 379
```

```
383 389 397 401 409 419 421 431 433 439 443 449 457 461
```

```
463 467 479 487 491 499 503 509 521 523 541
```

28. Java program to break integer into digits

```java
//Java program to break integer into digits

import java.util.Scanner;

public class Task28 {
   public static void main(String[] args) {
       Scanner scanner = new Scanner(System.in);
       System.out.print("Enter the number : ");
       int n = scanner.nextInt();
       String str = Integer.toString(n);
       char[] arr = new char[str.length()];
       for (int i = 0; i < str.length(); i++) {
           arr[i] = str.charAt(i);
       }
       System.out.println("Digits are : ");
       for (char c : arr) {
           System.out.print(c + " ");
       }
   }
}
```

Output :

```
Enter the number : 342
Digits are :
3 4 2
Process finished with exit code 0
```

29. Java Program to check if a given number is perfect square

```java
//Java Program to check if a given number is perfect square

import java.util.Scanner;

public class Task29 {
   public static void main(String[] args) {
       Scanner scanner = new Scanner(System.in);
       System.out.print("Enter the number : ");
       double n = scanner.nextFloat();
       double rt = Math.sqrt(n);
       if(Math.pow(rt,2) == n) {
           System.out.println("The number is perfect square.");
       }
       else
           System.out.println("The number is not perfect square.");
   }
}
```

Output :

```
Enter the number : 64578
The number is not perfect square.

Process finished with exit code 0
```

```
Enter the number : 625
The number is perfect square.

Process finished with exit code 0
```

30. Java Program to find square root of a number without sqrt method

```java
//Java Program to find square root of a number without sqrt method

import java.util.Scanner;

public class Task30 {
   public static void main(String[] args) {
       Scanner scanner = new Scanner(System.in);
       System.out.println("Enter the digit : ");
       int n = scanner.nextInt();
       System.out.println("The square root of "+n+" is : "+sqrt(n));
   }
   public static double sqrt(int number) {
       double temp;
       double sr = number / 2;
       do {
           temp = sr;
           sr = (temp + (number / temp)) / 2;
       } while ((temp - sr) != 0);
       return sr;
   }
}
```

Output :

```
Enter the digit :
625
The square root of 625 is : 25.0

Process finished with exit code 0
```

31. Java Program to print Armstrong numbers between a given range

```java
//Java Program to print Armstrong numbers between a given range

import java.util.Scanner;

public class Task31 {
   public static void main(String[] args) {
       Scanner scanner = new Scanner(System.in);
       System.out.println("Enter the range : ");
       int l = scanner.nextInt();
       int h = scanner.nextInt();
       for (int i = l; i <= h; i++) {
           int sum = 0;
           int temp = i;
           while(temp!=0) {
               int rem = temp%10;
               sum = sum + (int) Math.pow(rem,3);
               temp = temp/10;
           }
           if(i == sum)
               System.out.println(i + " ");
       }
   }
}
```

Output :

```
Enter the range :
1 500
1
153
370
371
407
```

32. Java Program to find GCD of two numbers

```java
//Java Program to find GCD of two numbers

import java.util.Scanner;

public class Task32 {
   public static void main(String[] args) {
       Scanner scanner = new Scanner(System.in);
       System.out.print("Enter the two numbers : ");
       int n = scanner.nextInt();
       int m = scanner.nextInt();
       System.out.println("The GCD of " + n + " and " + m + " is : " + GCD(n,m));
   }
   public static int GCD(int n, int m) {
       if(n == 0)
           return m;
       if(m == 0)
           return n;
       if(n == m)
           return n;
       if(n > m)
           return GCD(n-m, m);
       return GCD(n, m-n);
   }
}
```

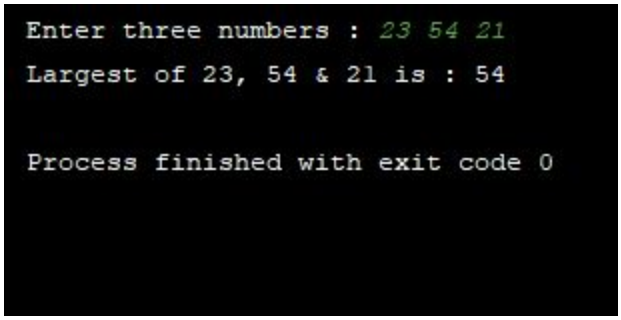
Output :

```
Enter the two numbers : 45 56
The GCD of 45 and 56 is : 1

Process finished with exit code 0
```

33. Java Program to find Largest of three numbers

```java
//Java Program to find Largest of three numbers

import java.util.Scanner;

public class Task33 {
   public static void main(String[] args) {
       Scanner scanner = new Scanner(System.in);
       System.out.print("Enter three numbers : ");
        int a = scanner.nextInt();
        int b = scanner.nextInt();
        int c = scanner.nextInt();
        System.out.println("Largest of "+a+", "+b+" & "+c+" is : "+largest(a,b,c));
   }

   private static int largest(int a, int b, int c) {
       int temp = a > b ? a : b;
       return temp > c ? temp : c;
   }
}
```

Output :



34. Java Program to swap two numbers using bitwise operator

```java
//Java Program to swap two numbers using bitwise operator

import java.util.Scanner;

public class Task34 {
   public static void main(String[] args) {
       Scanner scanner = new Scanner(System.in);
       System.out.println("Enter two numbers : ");
       int n = scanner.nextInt();
       int m = scanner.nextInt();
       swap(n,m);
   }
   public static void swap(int a, int b) {
       a = a ^ b;
       b = a ^ b;
       a = a ^ b;
       System.out.println("Swapped values are : "+ a +" and "+ b);
   }
}
```

Output :

```
Enter two numbers :
345
545
Swapped values are : 545 and 345

Process finished with exit code 0
```

35. Java Program to Find HCF and LCM of Two Numbers

```java
//Java Program to Find HCF and LCM of Two Numbers

import java.util.Scanner;

public class Task35 {
   public static void main(String[] args) {
       Scanner scanner = new Scanner(System.in);
       System.out.print("Enter two digits : ");
       int n = scanner.nextInt();
       int m = scanner.nextInt();
       System.out.println("The HCF of " + n + " and " + m + " is : " + HCF(n,m));
       System.out.println("The LCM of " + n + " and " + m + " is : " + LCM(n,m));
   }
   public static int HCF(int a, int b) {
       if(a == 0)
           return b;
       if(b == 0)
           return a;
       if(a == b)
           return a;
       if(a>b)
           return HCF(a-b, b);
       return HCF(a, b-a);
   }
   public static int LCM(int a, int b) {
       return ((a*b)/HCF(a,b));
   }
}
```

Output :

```
Enter two digits : 234 6465
The HCF of 234 and 6465 is : 3
The LCM of 234 and 6465 is : 504270

Process finished with exit code 0
```

36. Java Program for Linear Search

```java
//Java Program for Linear Search

import java.util.Scanner;

public class Task36 {
   public static void main(String[] args) {
       Scanner scanner = new Scanner(System.in);
       System.out.println("Enter the length of array : ");
       int n = scanner.nextInt();
       int[] arr = new int[n];
       System.out.println("Enter digits : ");
       for (int i = 0; i < n; i++) {
           arr[i] = scanner.nextInt();
       }
       System.out.print("Enter the number to search : ");
       int x = scanner.nextInt();
       if(linearSearch(arr,x))
           System.out.println(x+" exist in array.");
       else
           System.out.println(x+ " doesn't exist in array.");
   }
   public static boolean linearSearch(int[] arr, int x) {
       boolean flag = false;
       for (int value : arr) {
           if (x == value) {
               flag = true;
               break;
           }
       }
       return flag;
   }
}
```

Output :

```
Enter the length of array :
5
Enter digits :
23 54
3 76
34
Enter the number to search : 54
54 exist in array.
```

37. Java Program for Binary Search

```java
//Java Program for Binary Search

import java.util.Scanner;

public class Task37 {
   public static void main(String[] args) {
       Scanner scanner = new Scanner(System.in);
       System.out.println("Enter the length of the array : ");
       int n = scanner.nextInt();
       int[] arr = new int[n];
       System.out.println("Enter the numbers in sorted way : ");
       for (int i = 0 ; i < n; i++) {
           arr[i] = scanner.nextInt();
       }
       System.out.print("Enter the number to search : ");
       int x = scanner.nextInt();
       int i = binarySearch(arr, x, 0, arr.length);
       if(i > -1)
           System.out.println(x+" exist in array at "+(i+1)+".");
       else
           System.out.println(x+" doesn't exist in array.");
   }
   public static int binarySearch(int[] arr, int x, int l, int h) {
       if( l <= h) {
           int mid = (l+h)/2;
           if(arr[mid] == x)
               return mid;
           if(x > arr[mid])
               return binarySearch(arr, x, mid+1, h);
           else
               return binarySearch(arr, x, l,mid-1);
       } else
           return -1;
   }
}
```

Output :

```
Enter the length of the array :
4
Enter the numbers in sorted way :
34 546
5676
6865
Enter the number to search : 546
546 exist in array at 2.
```

38. Java Octal to Decimal conversion

```
//Java Octal to Decimal conversion

import java.util.Scanner;

public class Task38 {
   public static void main(String[] args) {
       Scanner scanner = new Scanner(System.in);
       System.out.println("Enter the number : ");
       int n = scanner.nextInt();
       System.out.println("The decimal conversion of octal no. "+n+" is :
"+decimal(n));
   }
   public static int decimal(int n) {
       int decValue = 0;
       int base = 1;
       int temp = n;
       while (temp > 0) {
           int last_digit = temp % 10;
           temp = temp / 10;
           decValue += last_digit * base;
           base = base * 8;
       }
       return decValue;
   }
}
```

Output :

```
Enter the number :
456
The decimal conversion of octal no. 456 is : 302

Process finished with exit code 0
```

39. Java Program to Convert Decimal to Octal

```
//Java Program to Convert Decimal to Octal

import java.util.Scanner;

public class Task39 {
   public static void main(String[] args) {
       Scanner scanner = new Scanner(System.in);
       System.out.println("Enter the number : ");
       int n = scanner.nextInt();
       System.out.println("The octal representation of decimal number "+n+" is :
"+octal(n));
   }
   public static int octal(int n) {
       int rem;
       String octal="";
       char[] octalChars={'0','1','2','3','4','5','6','7'};
       while(n>0)
       {
           rem = n % 8;
           octal = octalChars[rem] + octal;
           n = n/8;
       }
       return Integer.parseInt(octal);
   }
}
```

Output :

```
Enter the number :
455
The octal representation of deimal number 455 is : 707

Process finished with exit code 0
```

40. Java hexadecimal to decimal conversion

```java
//Java hexadecimal to decimal conversion

import java.util.Scanner;

public class Task40 {
   public static void main(String[] args) {
       Scanner scanner = new Scanner(System.in);
       System.out.println("Enter the hexadecimal number :  ");
       String str = scanner.nextLine();
       System.out.println("The decimal conversion of hexadecimal number "+str+" is
: "+hexToDecimal(str));
   }
   public static int hexToDecimal(String str) {
       String digits = "0123456789ABCDEF";
       str = str.toUpperCase();
       int val = 0;
       for (int i = 0; i < str.length(); i++)
       {
           char c = str.charAt(i);
           int d = digits.indexOf(c);
           val = 16*val + d;
       }
       return val;
   }
}
```

Output :

```
Enter the hexadecimal number :
A65F
The decimal conversion of hexadecimal number A65F is : 42591

Process finished with exit code 0
```

41. Java Program to convert decimal to hexadecimal

```
//Java Program to convert decimal to hexadecimal

import java.util.Scanner;

public class Task41 {
   public static void main(String[] args) {
       Scanner scanner = new Scanner(System.in);
       System.out.println("Enter the decimal number : ");
       int n = scanner.nextInt();
       System.out.println("The hexadecimal conversion of decimal number "+n+" is :
"+decToHex(n));
   }
   public static String decToHex(int n) {
       int rem;
       String hex="";
       char
hexchars[]={'0','1','2','3','4','5','6','7','8','9','A','B','C','D','E','F'};
       while(n>0)
       {
           rem = n % 16;
           hex = hexchars[rem] + hex;
           n = n / 16;
       }
       return hex;
   }
}
```

Output :

```
Enter the decimal number :
23432
The hexadecimal conversion of decimal number 23432 is : 5B88

Process finished with exit code 0
```

42. Java binary to octal conversion

```java
//Java binary to octal conversion

import java.util.Scanner;

public class Task42 {
   public static void main(String[] args) {
       Scanner scanner = new Scanner(System.in);
       System.out.println("Enter the binary number : ");
       long n = scanner.nextLong();
       System.out.println("The octal conversion of binary number "+n+" is :
"+binary(n));
   }
   public static int binary(long n) {
       int decNumber = 0, i = 0;
       while (n > 0) {
           decNumber += Math.pow(2, i++) * (n % 10);
           n /= 10;
       }
       return Task39.octal(decNumber);
   }
}
```

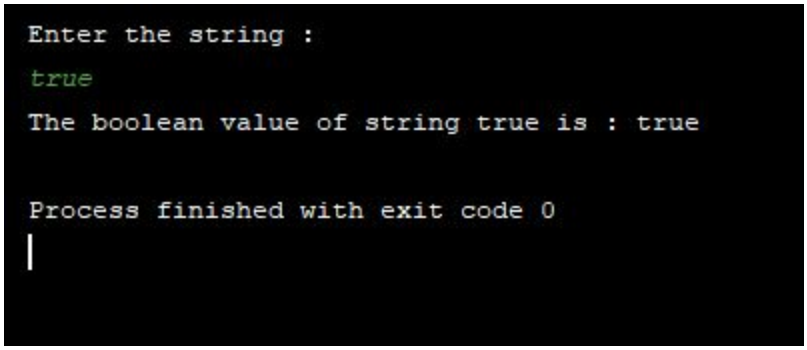
Output :

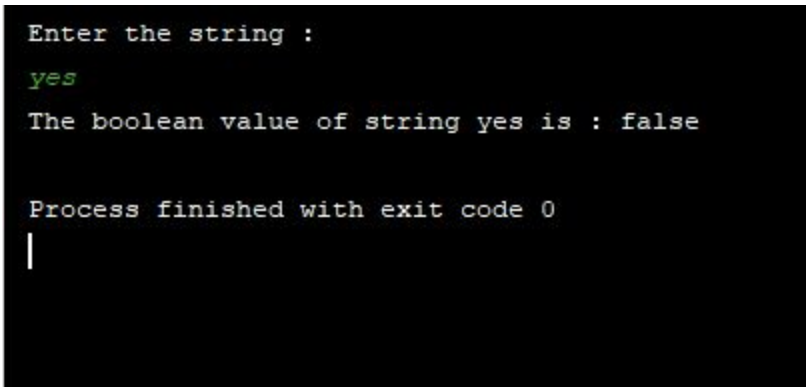
```
Enter the binary number :
100101
The octal conversion of binary number 100101 is : 45

Process finished with exit code 0
```

43. Java String to Boolean

```java
//Java String to Boolean

import java.util.Scanner;

public class Task43 {
   public static void main(String[] args) {
       Scanner scanner = new Scanner(System.in);
       System.out.println("Enter the string : ");
       String str = scanner.nextLine();
       System.out.println("The boolean value of string "+str+" is : "+bool(str));
   }
   public static boolean bool(String str) {
       boolean b = Boolean.parseBoolean(str);
       return b;
   }
}
```

Output :

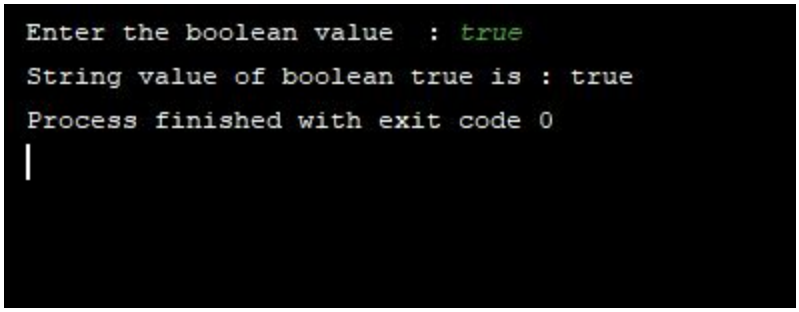




44. Java program to convert Boolean to String

```java
//Java program to convert Boolean to String

import java.util.Scanner;

public class Task44 {
   public static void main(String[] args) {
       Scanner scanner = new Scanner(System.in);
       System.out.print("Enter the boolean value  :");
       boolean bool = scanner.nextBoolean();
       System.out.print("String value of boolean "+bool+" is : "+string(bool));
   }
   public static String string(boolean bool) {
       String str = String.valueOf(bool);
       return str;
   }
}
```

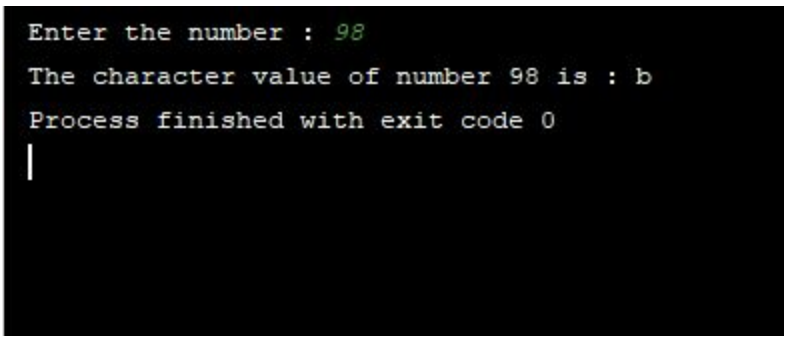
Output :



45. Java int to char conversion

```java
//Java int to char conversion

import java.util.Scanner;

public class Task45 {
   public static void main(String[] args) {
       Scanner scanner = new Scanner(System.in);
       System.out.print("Enter the number : ");
       int n = scanner.nextInt();
       System.out.print("The character value of number "+n+" is : "+ (char)(n));
   }
}
```

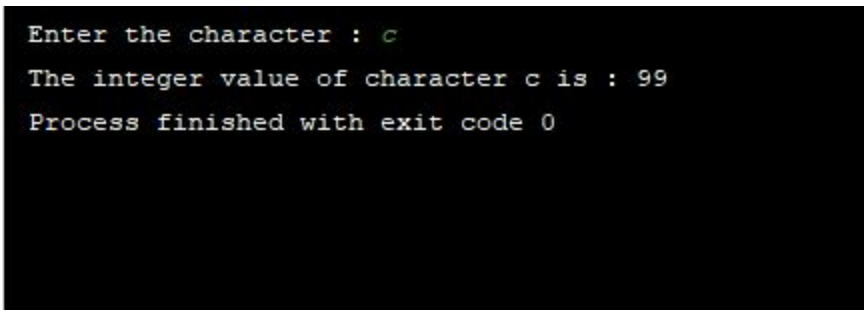
Output :



46. Java char to int conversion

```java
//Java char to int conversion

import java.util.Scanner;

public class Task46 {
   public static void main(String[] args) {
       Scanner scanner = new Scanner(System.in);
       System.out.print("Enter the character : ");
       char ch = scanner.next().charAt(0);
       System.out.print("The integer value of character "+ch+" is : " + (int)
(ch));
   }
}
```

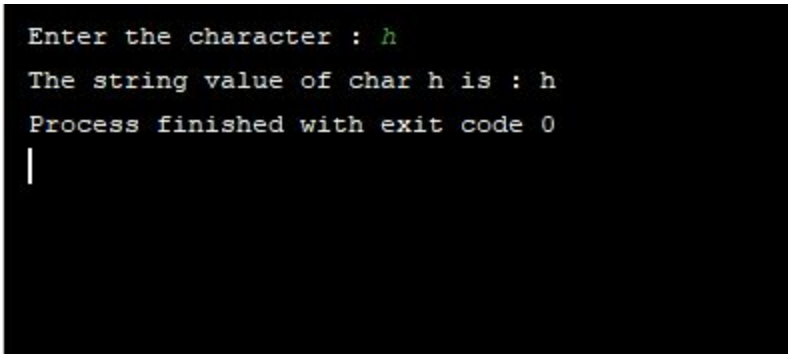
Output :



47. Java char to string conversion

```
//Java char to string conversion

import java.util.Scanner;

public class Task47 {
   public static void main(String[] args) {
       Scanner scanner = new Scanner(System.in);
       System.out.print("Enter the character : ");
       char ch = scanner.next().charAt(0);
       System.out.print("The string value of char "+ch+" is : "+
String.valueOf(ch));
   }
}
```

Output :



48. Java long to int conversion

```java
//Java long to int conversion

import java.util.Scanner;

public class Task48 {
   public static void main(String[] args) {
       Scanner scanner = new Scanner(System.in);
       System.out.println("Enter the long number : ");
       long n = scanner.nextLong();
       System.out.println("The integer value of long value "+n+" is : "+ (int)n);
   }
}
```

Output :

```
Enter the long number :
5326324
The integer value of long value 5326324 is : 5326324

Process finished with exit code 0
```

49. Java int to long conversion

```java
//Java int to long conversion

import java.util.Scanner;

public class Task49 {
   public static void main(String[] args) {
       Scanner scanner = new Scanner(System.in);
       System.out.println("Enter the integer value : ");
       int n = scanner.nextInt();
       System.out.println("The long value of integer value "+n+" is : "+(long)n);
   }
}
```

Output :

```
Enter the integer value :
3425
The long value of integer value 3425 is : 3425

Process finished with exit code 0
```

50. Java Program to Convert Decimal to Binary

```java
//Java Program to Convert Decimal to Binary

import java.util.Scanner;

public class Task50 {
   public static void main(String[] args) {
       Scanner scanner = new Scanner(System.in);
       System.out.println("Enter number : ");
       int n = scanner.nextInt();
       System.out.println("The binary conversion of decimal number "+n+" is : ");
       decToBin(n);
   }
   public static void decToBin(int n) {
       int[] binary = new int[40];
       int index = 0;
       while(n > 0){
           binary[index++] = n%2;
           n = n/2;
       }
       for(int i = index-1;i >= 0;i--){
           System.out.print(binary[i]);
       }
   }
}
```

Output :

```
Enter number :
6746
The binary conversion of decimal number 6746 is :
1101001011010
Process finished with exit code 0
```

51. Java Program to convert binary to Decimal

```java
//Java Program to convert binary to Decimal

import java.util.Scanner;

public class Task51 {
   public static void main(String[] args) {
       Scanner scanner = new Scanner(System.in);
       System.out.println("Enter the binary number : ");
       long n = scanner.nextLong();
       System.out.println("The decimal conversion of binary number "+n+" is :
"+binToDec(n));
   }
   public static int binToDec(long num) {
       int decimalNumber = 0, i = 0;
       long remainder;
       while (num != 0)
       {
           remainder = num % 10;
           num /= 10;
           decimalNumber += remainder * Math.pow(2, i);
           ++i;
       }
       return decimalNumber;
   }
}
```

Output :

```
Enter the binary number :
10110110
The decimal conversion of binary number 10110110 is : 182

Process finished with exit code 0
```

52. Java Program to find ASCII value of a character

```java
//Java Program to find ASCII value of a character

import java.util.Scanner;

public class Task52 {
   public static void main(String[] args) {
       Scanner scanner = new Scanner(System.in);
       System.out.println("Enter the character : ");
       char ch = scanner.next().charAt(0);
       System.out.println("The ASCII value of "+ch+" is : "+(int) ch);
   }
}
```

Output :

```
Enter the character :
G
The ASCII value of G is : 71

Process finished with exit code 0
```

53. Java program for String to int conversion

```java
//Java program for String to int conversion

import java.util.Scanner;

public class Task53 {
   public static void main(String[] args) {
       Scanner scanner = new Scanner(System.in);
       System.out.println("Enter the string : ");
       String str = scanner.nextLine();
       System.out.println("The integer value of string "+str+" is :
"+stringToInt(str));
   }
   public static int stringToInt(String str) {
       int val = 0;
       try {
           val = Integer.parseInt(str);
       }
       catch (NumberFormatException e) {
           System.out.println("Invalid String");
       }
       return val;
   }
}
```

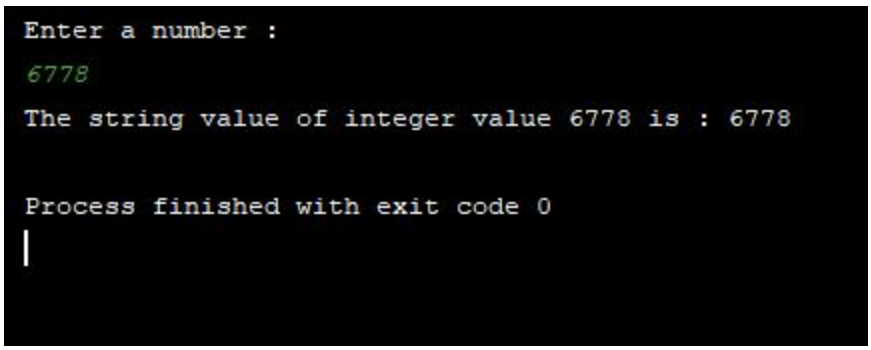
Output :

```
Enter the string :
454
The integer value of string 454 is : 454

Process finished with exit code 0
```

54. Java program to convert int to String

```java
//Java program to convert int to String

import java.util.Scanner;

public class Task54 {
   public static void main(String[] args) {
       Scanner scanner = new Scanner(System.in);
       System.out.println("Enter a number : ");
       int n = scanner.nextInt();
       String str = String.valueOf(n);
       System.out.println("The string value of integer value "+n+" is : "+str);
   }
}
```

Output :



55. Java program for string to double conversion

```
//Java program for string to double conversion

import java.util.Scanner;

public class Task55 {
   public static void main(String[] args) {
       Scanner scanner = new Scanner(System.in);
       System.out.println("Enter the string : ");
       String str = scanner.nextLine();
       System.out.println("The double value of string "+str+" is :
"+strDouble(str));
   }
   public static double strDouble(String str) {
       double val = 0;
       try {
           val = Double.parseDouble(str);
       } catch (NumberFormatException e){
           System.out.println("Invalid Input.");
       }
       return val;
   }
}
```

Output :

```
Enter the string :
4532.24
The double value of string 4532.24 is : 4532.24

Process finished with exit code 0
```

56. Java program to convert double to String

```java
//Java program to convert double to String

import java.util.Scanner;

public class Task56 {
   public static void main(String[] args) {
       Scanner scanner = new Scanner(System.in);
       System.out.println("Enter a float value : ");
       double d = scanner.nextDouble();
       String str = String.valueOf(d);
       System.out.println("The string value of double "+d+" is : "+str);
   }
}
```

Output :

```
Enter a float value :
56.42
The string value of double 56.42 is : 56.42

Process finished with exit code 0
```

57. Java program to convert String to long

```java
//Java program to convert String to long

import java.util.Scanner;

public class Task57 {
   public static void main(String[] args) {
       Scanner scanner = new Scanner(System.in);
       System.out.println("Enter the string : ");
       String str = scanner.nextLine();
       System.out.println("The long value of string "+str+" is : "+strToLong(str));
   }
   public static long strToLong(String str) {
       long val = 0;
       try {
           val = Long.parseLong(str);
       } catch (NumberFormatException e) {
           System.out.println("Invalid Input.");
       }
       return val;
   }
}
```

Output :

```
Enter the string :
32552236
The long value of string 32552236 is : 32552236

Process finished with exit code 0
```

58. Java program to convert long to String

```java
//Java program to convert long to String

import java.util.Scanner;

public class Task58 {
   public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.println("Enter a long value : ");
        long l = scanner.nextLong();
        System.out.println("The string value of long "+l+" is :
"+String.valueOf(l));
   }
}
```

Output :

```
Enter a long value :
3243453
The string value of long 3243453 is : 3243453

Process finished with exit code 0
```

59. Java Program to print Floyd’s triangle

```java
//Java Program to print Floyd's triangle

import java.util.Scanner;

public class Task59 {
   public static void main(String[] args) {
       Scanner scanner = new Scanner(System.in);
       System.out.print("Enter the no. of row : ");
       int n = scanner.nextInt();
       int k = 1;
       for (int i = 1; i <= n; i++) {
           for (int j = 1; j <= i; j++) {
               System.out.print(k + "   ");
               k++;
           }
           System.out.println();
       }
   }
}
```

Output :

```
Enter the no. of row : 6
1
2   3
4   5   6
7   8   9   10
11   12   13   14   15
16   17   18   19   20   21

Process finished with exit code 0
```

60. Java program to print Pascal triangle

```java
//Java program to print Pascal triangle

import java.util.Scanner;

public class Task60 {
   public static void main(String[] args) {
       Scanner scanner = new Scanner(System.in);
       System.out.print("Enter no. of rows : ");
       int n = scanner.nextInt();
       printPascal(n);
   }
   public static void printPascal(int n)
   {
       for (int i = 0; i < n; i++)
       {
           for (int j = 0; j <= i; j++)
               System.out.print(binomialCoeff(i, j)+" ");
           System.out.println();
       }
   }
   public static int binomialCoeff(int n, int m)
   {
       int res = 1;
       if (m > n - m)
           m = n - m;

       for (int i = 0; i < m; ++i)
       {
           res *= (n - i);
           res /= (i + 1);
       }
       return res;
   }
}
```

Outpost :

```
Enter no. of rows : 5
1
1 1
1 2 1
1 3 3 1
1 4 6 4 1

Process finished with exit code 0
```

61. Write a Java program for simple Calculator.

```
class CalculatorEngine {
    int value;
    int keep;
    char toDo;
    void binaryOperation (char op) {
        keep = value;
        value = 0;
        toDo = op;
    }
    void add() { binaryOperation ('+'); }
    void subtract() { binaryOperation ('-'); }
    void multiply() { binaryOperation ('*'); }
    void divide () { binaryOperation ('/'); }
    void compute () {
        if (toDo = '+')  value = keep + value;
        else if (toDo = '-')  value = keep - value;
        elseif (toDo = '*')  value = keep * value;
        elseif (toDo = '/')  value = keep / value;
        keep = 0;
    }
    void clear () {
        value = 0;
        keep = 0;
    }
    void digit (int x) {
        value = value * 10 + x;
    }
    int display() {
        return value;
    }
    CalculatorEngine () {
    clear();
    }
```

```
    public static void main (String[] args) {
        CalculatorEngine c = new CalculatorEngine();
        c.digit (1);
        c.digit (3);
        c.add ();
        c.digit (1);
        c.digit (1);
        c.compute ();
        System.out.println (c.display());
    }
}
```

output :

24

CalculatorInput.java

```
import java.io.*;
class CalculatorInput {
    BufferedReader stream;
    CalculatorEngine engine;
    CalculatorInput (CalculatorEngine e) {
        InputStreamReader input = new InputStreamReader
                                  (System.in);
        stream = new BufferedReader (input);
        engine = e;
    }
    void run() throws Exception {
        for (;;) {
            System.out.print("[" + engine.display() + "]");
            String m = stream.readLine();
            if (m == null)
                break;
```

```
                if (m.length() > 0)
                {
                    char c = m.charAt(0);
                    if (c == '+')
                        engine.add();
                    else if (c == '-')
                        engine.subtract();
                    else if (c == '*')
                        engine.multiply();
                    else if (c == '/')
                        engine.divide();
                    else if (c >= '0' && c <= '9')
                        engine.digit(c - '0');
                    else if (c == '=')
                        engine.compute();
                    else if (c == 'c' || c == 'C')
                        engine.clear();
                }
            }
        }
        public static void main(String[] args) throws
                Exception {
            CalculatorEngine e = new CalculatorEngine();
            CalculatorInput x = new CalculatorInput(e);
            x.run();
        }
}
```

output:

[0] 4
[4] 9
[49] 2
[492] c
[0] 4
[4] 9
[49] +
[0] 5
[5] 3
[53] =
[102] /
[0] 3
[3] =
[34]

62. Write a Java Program for a GUI Calculator.

Calculator.java.

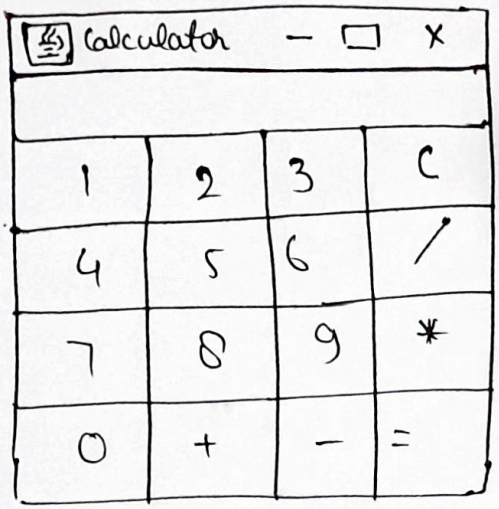
```
import java.awt.*;
import java.awt.event.*;
public class Calculator extends Frame implements ActionListener {
    Button bAdd, bSub, bMul, bDiv, bEqual, bClear;
    Button[] bDigit = new Button[10];
    TextArea txt = new TextArea();
    int m,n,r=0;
    char op;

    Calculator() {
        super("Calculator");
        setSize(250,300);
        setLayout(new BorderLayout());
        Panel p = new Panel();
        p.setLayout(new GridLayout(4,4));
        p.add(bDigit[1] = new Button("1"));
        bDigit[1].addActionListener(this);
        p.add(bDigit[2] = new Button("2"));
        bDigit[2].addActionListener(this);
        p.add(bDigit[3] = new Button("3"));
        bDigit[3].addActionListener(this);
        p.add(bClear = new Button("C"));
        bClear.addActionListener(this);
        p.add(bDigit[4] = new Button("4"));
        bDigit[4].addActionListener(this);
        p.add(bDigit[5] = new Button("5"));
        bDigit[5].addActionListener(this);
        p.add(bDigit[6] = new bDigit("6"));
        bDigit[6].addActionListener(this);
        p.add(bDiv = new Button("/"));
        bDiv.addActionListener(this);
```

```
p.add(bDigit[7] = new Button("7"));
bDigit[7].addActionListener(this);
p.add(bDigit[8] = new Button("8"));
bDigit[8].addActionListener(this);
p.add(bDigit[9] = new Button("9"));
bDigit[9].addActionListener(this);
p.add(bMul = new Button("*"));
bMul.addActionListener(this);
p.add(bDigit[0] = new Button("0"));
bDigit[0].addActionListener(this);
p.add(bAdd = new Button("+"));
bAdd.addActionListener(this);
p.add(bSub = new Button("-"));
bSub.addActionListener(this);
p.add(bEqual = new Button("="));
bEqual.addActionListener(this);
add(p, BorderLayout.CENTER);
add(txt, BorderLayout.NORTH);
addWindowListener(new WindowAdapter() {
    @Override
    public void windowClosing(WindowEvent e) {
        System.exit(0);
    }
});
setVisible(true);
}
@Override
public void actionPerformed(ActionEvent e) {
    Button bt = (Button) e.getSource();
    if (bt == bClear) {
        txt.setText("");
        n = m = r = 0;
    }
```

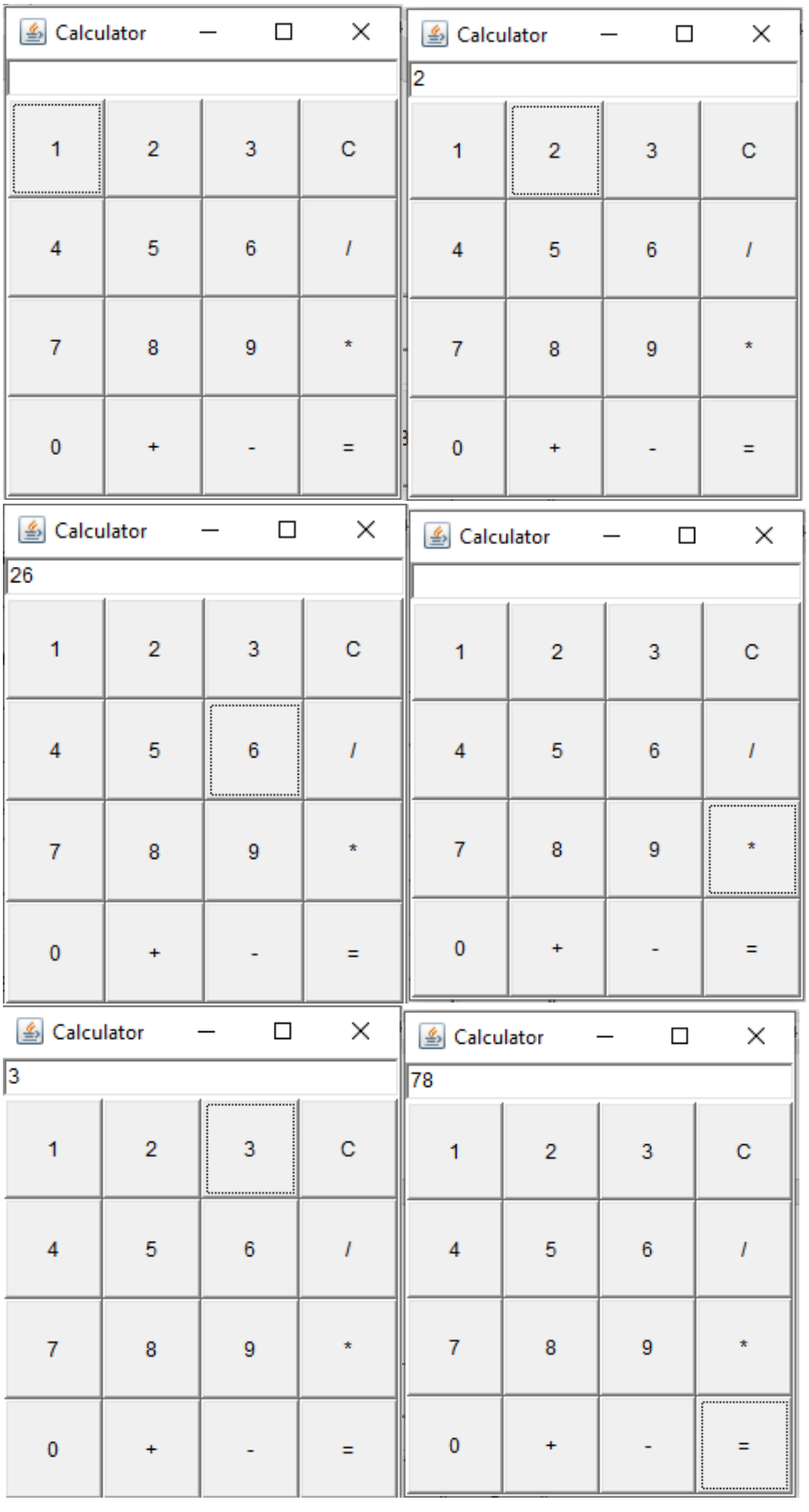
```
        else if (bt = bEqual) {
            m = Integer.parseInt(txt.getText());
            compute();
            txt.setText("" + r);
        } else {
            boolean flag=false;
            if(bt == bAdd) { op='+'; flag=true; }
            if(bt == bSub) { op='-'; flag=true; }
            if(bt == bMul) { op='*'; flag=true; }
            if(bt == bDiv) { op='/'; flag=true; }
            if (!flag){
                for (int i=0; i<10; i++) {
                    if (bt == bDigit[i]) {
                        String str= txt.getText();
                        str = str + i;
                        txt.setText (str);
                    }
                }
            } else {
                n= Integer.parseInt (txt.getText());
                txt.setText("");
            }
        }
    }
    private int compute() {
        switch(op) {
            case '+': r= n+m; break;
            case '-': r= n-m; break;
            case '*': r= n*m; break;
            case '/': r= n/m; break;
        }
        return 0;
    }
```

```
    public static void main (String [] args) {
        new Calculator ();
    }
}
```

Output:



Output :


Calculator
1 2 3 C
4 5 6 /
7 8 9 *
0 + - =
Calculator
2
1 2 3 C
4 5 6 /
7 8 9 *
0 + - =
Calculator
26
1 2 3 C
4 5 6 /
7 8 9 *
0 + - =
Calculator
1 2 3 C
4 5 6 /
7 8 9 *
0 + - =
Calculator
3
1 2 3 C
4 5 6 /
7 8 9 *
0 + - =
Calculator
78
1 2 3 C
4 5 6 /
7 8 9 *
0 + - =