Answer

Q.1 Write a java program print "Hello World".

Program:

```
class HelloWorld {
        public static void main (String[] args) {
                System.out.println("Hello World!");
        }
}
```

Output:

Hello world !

Q.2 Write a java program to show uses of final keyword with variable, method and class in Java.

Program:

```
public class A {
   // final variables
   final int x=10;
   final int y ;
   final int z=50;
     A(int y){
      this.y=y;  }
  // final method
   final void print(){
      //  z=20 cannot override value of the "z".
      System.out.println("Inside A:");
      System.out.println("X:"+x);
```

```
      System.out.println("Y:"+y);
      System.out.println("Z:"+z);
   }  }
// final class
final class B extends A   {
      B(int y) {   super(y)   }
/* override final method
   void  print() {
   System.out.println("Inside B:");
  System.out.println("X:"+x);
  System.out.println("Y:"+y);
  System.out.println("Z:"+z); }  // cannot override final method print(). it will give an error !
*/
 }
// class C extends B{}        // cannot extends final class B
class finalKeyword   {
   public static void main(String args[] )  {
      A a = new A(15);
      B b = new B(20);
     a.print();
     b.print();  }  }
```

Output:

```
Inside A:
X:10  , Y:15 ,  Z:50
Inside B :
X:10 , Y:20  ,  Z:50
```

Q.3 Write a java program to display uses of abstract keyword in Java.

Program:

```
abstract class detail{
   abstract void  printinfo();
}
class employee extends detail{
   void printinfo(){
      String name="imran khan";
      int age =22;
      float salary= 50000;
      System.out.println("employee detail:");
      System.out.println("name:"+name);
      System.out.println("age:"+age);
      System.out.println("salary:"+salary);   } }
public class Base {
  public static void main(String[] args) {
      employee E1=new employee();
      E1.printinfo()  ;  }   }
```

Output:

```
Name : imran  khan
Age : 22
Salary : 50000.0
```

Q.4 Write a java program to illustrate implementing an interface and extending a class in Java.

Program:

```
interface MyInterface {
	int x = 10;
	final int y = 20;
	public void display();
	public static void getInterface() {
		System.out.println("This is Interface.");
	}
}
class Test {
	int z;
	public void show() {
		System.out.println("This is Class.");
	}
}
class Inherited extends Test implements MyInterface {
	public void display() {
		System.out.println("This is Inherited Class.");
	}
}
class InheritanceWithInterface {
	public static void main(String[] a) {
		//MyInterface test = new MyInterface(); //Interface cannot be instantiated.
		MyInterface i = new Inherited();
```

```
            Inherited obj = new Inherited();
            System.out.println("x : " + obj.x);
            System.out.println("y : " + obj.y);
            System.out.println("z : " + obj.z);

            i.display();
            MyInterface.getInterface();

            obj.display();
            obj.show();
        }
}
```

Output:

```
x : 10
y : 20
z : 0
This is Inherited Class.
This is Interface.
This is Inherited Class.
This is Class.
```

Q.5 Write a java program that prints all real solutions to the quadratic equation ax2 +bx+c=0. Read in a, b, c and use the quadratic formula.

Program:

```
import java.util.Scanner ;

public class Quadratic_equation {


   public static void calculateroots(int a,int b,int c){
      if(a==0){
         System.out.println("a cannot be zero ");
         return;
      }
      System.out.println("quadratic equation:"+a+"x2+"+b+"x+"+c);
      int d=(b*b-4*a*c) ;   //  here d is define as discriminant;
      if(d<0) {
         System.out.println("There are no real solution !");
         return ;
      }
      else if(d>0){
         System.out.println("There are two real solution !");
         double x = (-b+ Math.sqrt(d))/(2*a);
         System.out.println("first solution is:"+x);
         double y = (-b- Math.sqrt(d))/(2*a);
         System.out.println("second solution is:"+y);
      }
      else{
```

```
            System.out.println("There is only one real solution");
            System.out.println("solution,X="+(-b/2*a));
        }
    }
    public static void main(String args[]){
        Scanner obj=new Scanner(System.in);
        System.out.print("enter value of a:");
        int a = obj.nextInt();
        System.out.print("enter value of b:");
        int b = obj.nextInt();
        System.out.print("eneter value of c:");
        int c= obj.nextInt();
        calculateroots(a,b, c);
    }
}
```

Output:

enter value of a: 6

enter value of b: 8

eneter value of c: 2

quadratic equation: 6x2+8x+2

There are two real solution !

first solution is:-0.3333333333333333

second solution is:-1.0

Q.6 The following rule defines the Fibonacci sequence. The first two values in the sequence are 1 and 1. Every subsequent value is the sum of the two values preceding it. Write a java program that uses both recursive and non-recursive functions.

Program:

```
import java.util.Scanner;
class Fibo {
        static int first=1,second=1,third;
static void reset()
{
        first=second=1;
        System.out.print(first+"  "+second+"  ");
}
static void nonrecursive(int n){
        int count=2;
        while(count<n){
        third=first+second;
        first=second;
        second=third;
        System.out.print(third+"  ");
   count++;
}
static void recursive(int n){
        if(n==0){
                return;   }
```

```
        third=first+second;
        first=second;
        second=third;
        System.out.print(third+"  ");
        recursive(n-1);
}
public static void main(String args[]){
 int n;
System.out.print("enter count:");
Scanner obj = new Scanner(System.in);
n=obj.nextInt();
System.out.println("non-recursive:");
reset();
nonrecursive(n);
System.out.println("\nnon-recursive:");
reset();
recursive(n-2);
  }
}
```

Output:

```
non-recursive:  1  1  2  3  5  8  13  21  34  55
     recursive:   1  1  2  3  5  8  13  21  34  55
```