1. **Program: 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 QuadraticEquationExample1

{

public static void main(String[] Strings)

{

Scanner input = new Scanner(System.in);

System.out.print("Enter the value of a: ");

double a = input.nextDouble();

System.out.print("Enter the value of b: ");

double b = input.nextDouble();

System.out.print("Enter the value of c: ");

double c = input.nextDouble();

double d= b * b - 4.0 * a * c;

if (d> 0.0)

{

double r1 = (-b + Math.pow(d, 0.5)) / (2.0 * a);

double r2 = (-b - Math.pow(d, 0.5)) / (2.0 * a);

System.out.println("The roots are " + r1 + " and " + r2);

}

else if (d == 0.0)

{
```

```
double r1 = -b / (2.0 * a);

System.out.println("The root is " + r1);

}

else

{

System.out.println("Roots are not real.");

}

}

}
```

2. **Create a Java class called Student with the following details as variables within it.**
   (i) USN
   (ii) Name
   (iii) Branch
   (iv) Phone
   Write a Java program to create n Student objects and print the USN, Name, Branch, and Phone of these objects with suitable headings.

```
//Program: Save the program with Lab1A.java
import java.io.*;
class Student
{
String usn, name, branch;
long ph;
Student()
{
usn = name = branch = "no value";
ph = 0;
}
void read_data(String u, String n, String b, long p)
{
usn = u;
name = n;
branch = b;
ph =p;
}

void display()
{
```

```
System.out.println(usn + "\t" + name + "\t" + branch + "\t\t" + ph);
}
}
class Lab1A
{
public static void main(String args[]) throws Exception
{
String u, n, b;
long p;
int no;
BufferedReader br = new BufferedReader(new InputStreamReader(System.in));
System.out.println("Enter number of records");
no = Integer.parseInt(br.readLine());
Student[] s = new Student[no];
for(int i=0; i<s.length;i++)
{
System.out.println("Enter " + (i + 1) + " Student record");
s[i] = new Student();
System.out.println("Enter student USN");
u = br.readLine();
System.out.println("Enter student Name");
n = br.readLine();

System.out.println("Enter student Branch");
b = br.readLine();
System.out.println("Enter student Phone number");
p = Long.parseLong(br.readLine());
s[i].read_data(u, n, b, p);
}
System.out.println("USN \t\t NAME \t BRANCH \t PHONE NO");
for(int i=0; i<s.length;i++)
{
s[i].display();
}
}
}
```

3A. Write a program to check prime number

```
public class PrimeExample{

 public static void main(String args[]){

  int i,m=0,flag=0;

  int n=3;//it is the number to be checked

  m=n/2;

  if(n==0||n==1){
```

```
 System.out.println(n+" is not prime number");
}else{
 for(i=2;i<=m;i++){
  if(n%i==0){
   System.out.println(n+" is not prime number");
   flag=1;
   break;
  }
 }
 if(flag==0)  { System.out.println(n+" is prime number"); }
}//end of else
}
}
```

3B. Write a program for Arithmetic calculator using switch case menu

```
import java.util.Scanner;

class Main {
  public static void main(String[] args) {

    char operator;
    Double number1, number2, result;

    // create an object of Scanner class
    Scanner input = new Scanner(System.in);
```

```
// ask users to enter operator
System.out.println("Choose an operator: +, -, *, or /");
operator = input.next().charAt(0);

// ask users to enter numbers
System.out.println("Enter first number");
number1 = input.nextDouble();

System.out.println("Enter second number");
number2 = input.nextDouble();

switch (operator) {

  // performs addition between numbers
  case '+':
    result = number1 + number2;
    System.out.println(number1 + " + " + number2 + " = " + result);
    break;

  // performs subtraction between numbers
  case '-':
    result = number1 - number2;
    System.out.println(number1 + " - " + number2 + " = " + result);
    break;
```

```
        // performs multiplication between numbers
        case '*':
          result = number1 * number2;
          System.out.println(number1 + " * " + number2 + " = " + result);
          break;

        // performs division between numbers
        case '/':
          result = number1 / number2;
          System.out.println(number1 + " / " + number2 + " = " + result);
          break;

        default:
          System.out.println("Invalid operator!");
          break;
      }

      input.close();
    }
  }
```

4. Design a super class called Staff with details as StaffId, Name, Phone, Salary. Extend this class by writing three subclasses namely Teaching (domain, publications), Technical (skills), and Contract (period). Write a Java program to read and display at least 3 staff objects of all three categories.

```
import java.io.*;
class Staff
{
private int staffid;
private String name;
private long phone;
private int salary;
BufferedReader br = new BufferedReader(new InputStreamReader(System.in));
void Read_Staff() throws Exception
{
System.out.println("Enter Staff ID");
staffid = Integer.parseInt(br.readLine());
System.out.println("Enter Staff Name");
name = br.readLine();
System.out.println("Enter Staff Phone number");
phone = Long.parseLong(br.readLine());
System.out.println("Enter Staff Salary");
salary = Integer.parseInt(br.readLine());
}
void Display_Staff()
{

System.out.print(staffid + "\t" + name + "\t" + phone + "\t" + salary + "\t");
}
}
class Teaching extends Staff
{
private String domain;
private String pub;
void Read_Teaching() throws Exception
{
super.Read_Staff();
System.out.println("Enter Domain");
domain = br.readLine();
System.out.println("Enter Publications");
pub = br.readLine();
}
void Display_Teaching()
{
super.Display_Staff();
System.out.println(domain + "\t" + pub);
}
}
class Technical extends Staff
{
private String skills;

void Read_Technical() throws Exception
{
super.Read_Staff();
```

```
System.out.println("Enter skills");
skills = br.readLine();
}
void Display_Technical()
{
super.Display_Staff();
System.out.println(skills);
}
}
class Contract extends Staff
{
private float period;
void Read_Contract() throws Exception
{
super.Read_Staff();
System.out.println("Enter Experience in years");
period = Float.parseFloat(br.readLine());
}
void Display_Contract()
{
super.Display_Staff();

System.out.println(period);
}
}
class LAB2A
{
public static void main(String[] args) throws Exception
{
BufferedReader br = new BufferedReader(new InputStreamReader(System.in));
System.out.println("Enter your choice");
System.out.println("1. Teaching \n 2. Technical \n 3. Contract ");
int ch = Integer.parseInt(br.readLine());
System.out.println("Enter number of records");
int no = Integer.parseInt(br.readLine());
switch(ch)
{
case 1: Teaching[] t = new Teaching[no];
for(int i = 0; i < t.length; i++ )
{
System.out.println("Enter " + (i + 1) + " details");
t[i] = new Teaching();
t[i].Read_Teaching();
}
System.out.println("Teaching Staff details are as follows:");
System.out.println("StaffID" + "\t" + "Name" + "\t" + "Phone" + "\t\t" + "Salary" + "\t"
+ "Domain" + "\t" + "Publications");

for(int i = 0; i < t.length; i++ )
{
```

```
t[i].Display_Teaching();
}
break;
case 2: Technical[] tech = new Technical[no];
for(int i = 0; i < tech.length; i++ )
{
System.out.println("Enter " + (i + 1) + " details");
tech[i] = new Technical();
tech[i].Read_Technical();
}
System.out.println("Technical Staff details are as follows:");
System.out.println("StaffID" + "\t" + "Name" + "\t" + "Phone" + "\t\t" + "Salary" + "\t"
+ "Skills" );
for(int i = 0; i < tech.length; i++ )
{
tech[i].Display_Technical();
}
break;
case 3: Contract[] c = new Contract[no];
for(int i = 0; i < c.length; i++ )
{
System.out.println("Enter " + (i + 1) + " details");
c[i] = new Contract();
c[i].Read_Contract();
}
System.out.println("Technical Staff details are as follows:");
System.out.println("StaffID" + "\t" + "Name" + "\t" + "Phone" + "\t\t" + "Salary" + "\t" +
"Period" );

for(int i = 0; i < c.length; i++ )
{
c[i].Display_Contract();
}
break;
default:System.out.println("Wrong Choice");
break;
}
}
}
```