1) QUADRATIC EQUATION

```
import java.util.Scanner;
public class Quadratic {
public static void main(String[] args) {
   System.out.println("Name: Aarusha GP, USN: 1BM23CS005");

   Scanner input = new Scanner(System.in);

   System.out.print("Enter the coefficient of a: ");
   double a = input.nextDouble();

   while (a == 0) {
      System.out.println("Coefficient 'a' cannot be zero in a quadratic equation.");
      input.close();
      return;
   }

   System.out.print("Enter the coefficient of b: ");
   double b = input.nextDouble();

   System.out.print("Enter the coefficient of c: ");
   double c = input.nextDouble();
   double discriminant = b * b - 4 * a * c;
   if (discriminant > 0) {
      double root1 = (-b + Math.sqrt(discriminant)) / (2 * a);
      double root2 = (-b - Math.sqrt(discriminant)) / (2 * a);
      System.out.printf("The equation has two real solutions: %.2f and %.2f%n", root1, root2);
   } else if (discriminant == 0) {
      double root = -b / (2 * a);
      System.out.printf("The equation has one real solution: %.2f%n", root);
   } else {
```

```
            double realPart = -b / (2 * a);
            double imaginaryPart = Math.sqrt(-discriminant) / (2 * a);
            System.out.printf("Roots are imaginary.%n");
            System.out.printf("Root 1 = %.2f + %.2fi%n", realPart, imaginaryPart);
            System.out.printf("Root 2 = %.2f - %.2fi%n", realPart, imaginaryPart);
        }

        input.close();
    }
}
```

OUTPUT:

```
C:\Users\arush\OneDrive\Desktop\1bm23cs005>javac  Quadratic.java

C:\Users\arush\OneDrive\Desktop\1bm23cs005>java  Quadratic
Name: Aarusha GP, USN: 1BM23CS005
Enter the coefficient of a: 1
Enter the coefficient of b: -3
Enter the coefficient of c: 2
The equation has two real solutions: 2.00 and 1.00
```

```
C:\Users\arush\OneDrive\Desktop\1bm23cs005>javac  Quadratic.java

C:\Users\arush\OneDrive\Desktop\1bm23cs005>java  Quadratic
Name: Aarusha GP, USN: 1BM23CS005
Enter the coefficient of a: 1
Enter the coefficient of b: 2
Enter the coefficient of c: 5
Roots are imaginary.
Root 1 = -1.00 + 2.00i
Root 2 = -1.00 - 2.00i
```