Basic Java Programs

1. Hello World Program

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

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2. Print Numbers from 1 to 10

```
java
Copy code
public class PrintNumbers {
    public static void main(String[] args) {
        for (int i = 1; i <= 10; i++) {
            System.out.println(i);
        }
    }
}
```

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3. Print Array Elements

```
java
Copy code
public class PrintArray {
    public static void main(String[] args) {
        int[] arr = {1, 2, 3, 4, 5};
        for (int num : arr) {
            System.out.println(num);
        }
    }
}
```

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4. Input Array Elements

```
java
Copy code
import java.util.Scanner;

public class InputArray {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter the number of elements:");
        int n = sc.nextInt();
        int[] arr = new int[n];

        System.out.println("Enter the elements:");
        for (int i = 0; i < n; i++) {
            arr[i] = sc.nextInt();
        }

        System.out.println("Array elements are:");
        for (int num : arr) {
            System.out.println(num);
        }
    }
}
```

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5. Define a Method to Print Array Elements

```
java
Copy code
public class ArrayMethods {
    public static void printArray(int[] arr) {
        for (int num : arr) {
            System.out.println(num);
        }
    }

    public static void main(String[] args) {
        int[] arr = {10, 20, 30, 40};
        printArray(arr);
    }
}
```

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6. Define a Method to Input Array Elements

```
java
Copy code
import java.util.Scanner;

public class ArrayMethods {
    public static int[] inputArray(int n) {
        Scanner sc = new Scanner(System.in);
        int[] arr = new int[n];

        System.out.println("Enter the elements:");
        for (int i = 0; i < n; i++) {
            arr[i] = sc.nextInt();
        }

        return arr;
    }

    public static void main(String[] args) {
        int[] arr = inputArray(5);
        for (int num : arr) {
            System.out.println(num);
        }
    }
}
```

---

7. Array of Objects (Students)

```
java
Copy code
public class Student {
    String name;
    int age;

    public Student(String name, int age) {
        this.name = name;
        this.age = age;
    }

    public static void main(String[] args) {
        Student[] students = {
            new Student("Alice", 20),
            new Student("Bob", 22)
        };

        for (Student s : students) {
            System.out.println("Name: " + s.name + ", Age: " +
s.age);
        }
    }
}
```

Homework Tasks

R-1.1: Method to Input All Base Types

```
java
Copy code
import java.util.Scanner;

public class InputAllBaseTypes {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);

        System.out.println("Enter an int:");
        int intValue = sc.nextInt();

        System.out.println("Enter a float:");
        float floatValue = sc.nextFloat();

        System.out.println("Enter a double:");
        double doubleValue = sc.nextDouble();

        System.out.println("Enter a long:");
        long longValue = sc.nextLong();

        System.out.println("Enter a char:");
        char charValue = sc.next().charAt(0);

        System.out.println("Enter a boolean:");
        boolean boolValue = sc.nextBoolean();

        System.out.println("Entered values are:");
        System.out.printf("int: %d, float: %.2f, double: %.2f,
long: %d, char: %c, boolean: %b%n",
                intValue, floatValue, doubleValue, longValue,
charValue, boolValue);
    }
}
```

R-1.2: Array Cloning and Behavior

```
java
Copy code
public class ArrayCloning {
    public static void main(String[] args) {
        GameEntry[] A = new GameEntry[5];
        for (int i = 0; i < 5; i++) {
            A[i] = new GameEntry(i * 100);
        }

        GameEntry[] B = A.clone();
        A[4].setScore(550);

        System.out.println("Score in A[4]: " + A[4].getScore());
        System.out.println("Score in B[4]: " + B[4].getScore());
    }
}

class GameEntry {
    private int score;

    public GameEntry(int score) {
        this.score = score;
    }

    public int getScore() {
        return score;
    }

    public void setScore(int score) {
        this.score = score;
    }
}
```

R-1.3: Method to Check Multiples

```
java
Copy code
public class IsMultiple {
    public static boolean isMultiple(long n, long m) {
        return n % m == 0;
    }

    public static void main(String[] args) {
        System.out.println(isMultiple(10, 2)); // true
        System.out.println(isMultiple(10, 3)); // false
    }
}
```

R-1.4: Method to Check Even Numbers

```
java
Copy code
public class IsEven {
    public static boolean isEven(int n) {
        return (n & 1) == 0;
    }

    public static void main(String[] args) {
        System.out.println(isEven(4)); // true
        System.out.println(isEven(7)); // false
    }
}
```

R-1.5: Sum of Positive Integers

```
java
Copy code
public class SumPositive {
    public static int sumUpTo(int n) {
        return n * (n + 1) / 2;
    }

    public static void main(String[] args) {
        System.out.println(sumUpTo(10)); // 55
    }
}
```

R-1.6: Sum of Odd Positive Integers

```
java
Copy code
public class SumOddPositive {
    public static int sumOddUpTo(int n) {
        int sum = 0;
        for (int i = 1; i <= n; i += 2) {
            sum += i;
        }
        return sum;
    }

    public static void main(String[] args) {
        System.out.println(sumOddUpTo(10)); // 25
    }
}
```

R-1.7: Sum of Squares

```
java
Copy code
public class SumSquares {
    public static int sumSquaresUpTo(int n) {
        int sum = 0;
        for (int i = 1; i <= n; i++) {
            sum += i * i;
        }
        return sum;
    }

    public static void main(String[] args) {
        System.out.println(sumSquaresUpTo(3)); // 14
    }
}
```

R-1.8: Count Vowels

```
java
Copy code
public class CountVowels {
    public static int countVowels(String s) {
        int count = 0;
        String vowels = "aeiouAEIOU";
        for (char c : s.toCharArray()) {
            if (vowels.indexOf(c) != -1) {
                count++;
            }
        }
        return count;
    }

    public static void main(String[] args) {
        System.out.println(countVowels("Hello World")); // 3
    }
}
```

R-1.9: Remove Punctuation

```
java
Copy code
public class RemovePunctuation {
    public static String removePunctuation(String s) {
        return s.replaceAll("\\p{Punct}", "");
    }

    public static void main(String[] args) {
        System.out.println(removePunctuation("Let’s try,
Mike!")); // Lets try Mike
    }
}
```

R-1.10: Flower Class

```
java
Copy code
public class Flower {
    private String name;
    private int petals;
    private float price;

    public Flower(String name, int petals, float price) {
        this.name = name;
        this.petals = petals;
        this.price = price;
    }

    public String getName() {
        return name;
    }

    public void setName(String name) {
        this.name = name;
    }

    public int getPetals() {
        return petals;
    }

    public void setPetals(int petals) {
        this.petals = petals;
    }

    public float getPrice() {
        return price;
    }

    public void setPrice(float price) {
        this.price = price;
    }

    public static void main(String[] args) {
        Flower flower = new Flower("Rose", 10, 2.5f);
        System.out.println(flower.getName() + " " +
flower.getPetals() + " " + flower.getPrice());
    }
}
```

R-1.11 & R-1.12: CreditCard Modifications

```
java
Copy code
public class CreditCard {
    private String customer;
    private double balance;
    private double creditLimit;

    public CreditCard(String customer, double balance, double
creditLimit) {
        this.customer = customer;
        this.balance = balance;
        this.creditLimit = creditLimit;
    }

    public void updateCreditLimit(double newLimit) {
        this.creditLimit = newLimit;
    }

    public void processPayment(double amount) {
        if (amount > 0) {
            balance -= amount;
        }
    }

    public static void main(String[] args) {
        CreditCard card = new CreditCard("Alice", 500, 1000);
        card.processPayment(-50); // Ignored
        System.out.println(card.balance);
    }
}
```

R-1.13: Main Method Modification

```
java
Copy code
public class TestCreditCards {
    public static void main(String[] args) {
        CreditCard[] cards = new CreditCard[3];
        cards[0] = new CreditCard("Alice", 500, 1000);
        cards[1] = new CreditCard("Bob", 900, 1000);
        cards[2] = new CreditCard("Charlie", 1000, 1000);

        for (int i = 0; i < cards.length; i++) {
            cards[i].processPayment(1100); // Only Charlie
exceeds
        }
    }
}
```