Assignment 2

Module: Java Programming
Assigned: 29 July 2019
Due: 8 August 2019

Arrays

1. **Read an array and print it.**

```
import java.util.Scanner;
class QuestionOne {
   public static void main(String[] args) {
       int[] a = new int[10];
       Scanner s = new Scanner(System.in);

       for (int i = 0; i < a.length; i++) {
           System.out.print("Enter number: ");
           a[i] = s.nextInt();
       }

       //printing the array
       for (int i: a) {
           System.out.println(i);
       }
   }
}
```

2. **Read an array and print it in reverse.**

```
import java.util.Scanner;

class QuestionTwo {
   public static void main(String[] args) {
       int[] a = new int[10];

       Scanner s = new Scanner(System.in);

       for (int i = 0; i < a.length; i++) {
           System.out.print("Enter number: ");
           a[i] = s.nextInt();
       }

       for (int i = a.length - 1; i >= 0; i--) {
           System.out.println(a[i]);
       }
   }
}
```

3. **Read an array and find the sum of array.**

```
import java.util.Scanner;

class QuestionThree {
   public static void main(String[] args) {
       int[] a = new int[10];
       Scanner s = new Scanner(System.in);

       for (int i = 0; i < a.length; i++) {
           System.out.print("Enter number: ");
           a[i] = s.nextInt();
       }

       int sum = 0;

       for (int i: a) {
           sum += i;
       }

       System.out.println("The sum is " + sum);
   }
}
```

4. **Read an array and find the average of the array.**

```
import java.util.Scanner;

class QuestionFour {
   public static void main(String[] args) {
       int[] a = new int[10];
       Scanner s = new Scanner(System.in);

       for (int i = 0; i < a.length; i++) {
           System.out.print("Enter number: ");
           a[i] = s.nextInt();
       }

       int sum = 0;

       for (int i: a) {
           sum += i;
       }

       System.out.println("Average of array is " + ((float) sum/a.length));
   }
}
```

5. **Read an array and count how many elements are divisible by 10.**

```
import java.util.Scanner;
class QuestionFive {
   public static void main(String[] args) {
       int[] a = new int[10];
       Scanner s = new Scanner(System.in);

       for (int i = 0; i < a.length; i++) {
           System.out.print("Enter number: ");
           a[i] = s.nextInt();
       }

       int count = 0;

       for (int i: a) {
           if (i % 10 == 0) {
               count++;
           }
       }

       System.out.println("Count of numbers divisible by 10: " + count);
   }
}
```

6. **Read an array and count how many elements are even and odd.**

```
import java.util.Scanner;
class QuestionSix {
   public static void main(String[] args) {
       int[] a = new int[10];
       Scanner s = new Scanner(System.in);

       for (int i = 0; i < a.length; i++) {
           System.out.print("Enter number: ");
           a[i] = s.nextInt();
       }

       int even = 0, odd = 0;

       for (int i: a) {
           if (i % 2 == 0) even++;
           else odd++;
       }

       System.out.println("Count of Even numbers: " + even);
       System.out.println("Count of Odd numbers: " + odd);
   }
}
```

7. **Read an array and find sum of even elements and odd elements.**

```
import java.util.Scanner;
class QuestionSeven {
   public static void main(String[] args) {
       int[] a = new int[10];
       Scanner s = new Scanner(System.in);
       for (int i = 0; i < a.length; i++) {
           System.out.print("Enter number: ");
           a[i] = s.nextInt();
       }
       int evenSum = 0, oddSum = 0;
       for (int i : a) {
           if (i % 2 == 0)
               evenSum += i;
           else
               oddSum += i;
       }
       System.out.println("Sum of even numbers: " + evenSum);
       System.out.println("Sum of odd numbers: " + oddSum);
   }
}
```

8. **Read an array and count how many positive and negative numbers are there.**

```
import java.util.Scanner;

class QuestionEight {
   public static void main(String[] args) {
       int[] a = new int[10];
       Scanner s = new Scanner(System.in);

       for (int i = 0; i < a.length; i++) {
           System.out.print("Enter number: ");
           a[i] = s.nextInt();
       }

       int cp = 0, cn = 0;
       for (int i : a) {
           if (i > 0)
               cp++;
           if (i < 0)
               cn++;
       }

       System.out.println("Count of postive numbers: " + cp);
       System.out.println("Count of negative numbers: " + cn);
   }
}
```

9. Read an array and find positive sum and negative sum.

```
import java.util.Scanner;

class QuestionNine {
   public static void main(String[] args) {
       int[] a = new int[10];
       Scanner s = new Scanner(System.in);

       for (int i = 0; i < a.length; i++) {
           System.out.print("Enter number: ");
           a[i] = s.nextInt();
       }

       int ps = 0, ns = 0;
       for (int i : a) {
           if (i > 0)
               ps += i;
           if (i < 0)
               ns += i;
       }

       System.out.println("Positive sum: " + ps);
       System.out.println("Negative sum: " + ns);
   }
}
```

10. Read an array and find if a number is present or not.

```
import java.util.Scanner;

class QuestionTen {
   public static void main(String[] args) {
       int[] a = new int[10];
       int needle;
       boolean found = false;
       Scanner s = new Scanner(System.in);

       for (int i = 0; i < a.length; i++) {
           System.out.print("Enter number: ");
           a[i] = s.nextInt();
       }

       System.out.print("Enter number to search: ");
       needle = s.nextInt();

       for (int i : a) {
           if (i == needle) {
               found = true;
```

```
                break;
            }
        }

        if (found) {
            System.out.println("Number present");
        } else {
            System.out.println("Number NOT present");
        }
    }
}
```

11. Read an array count how many times a number occurs in the array.

```
import java.util.Scanner;

class QuestionEleven {
    public static void main(String[] args) {
        int[] a = new int[10];
        int needle;
        Scanner s = new Scanner(System.in);

        for (int i = 0; i < a.length; i++) {
            System.out.print("Enter number: ");
            a[i] = s.nextInt();
        }

        System.out.print("Enter number to search for: ");
        needle = s.nextInt();

        int count = 0;

        for (int i : a) {
            if (i == needle) {
                count++;
            }
        }

        System.out.println("The number " + needle + " is present " + count + "
times in the array");
    }
}
```

12. Read an array and sort it in ascending order.

```
import java.util.Scanner;

class QuestionTwelve {
   public static void main(String[] args) {
       int[] n = new int[10];
       Scanner s = new Scanner(System.in);

       for (int i = 0; i < n.length; i++) {
           System.out.print("Enter number " + (i + 1) + ": ");
           n[i] = s.nextInt();
       }
       printArray(n);
       n = sortDesc(n);
       printArray(n);
   }

   public static int[] sortDesc(int[] n) {
       for (int i = 0; i < n.length; i++) {
           for (int j = i + 1; j < n.length; j++) {
               if (n[j] < n[i]) {
                   int tmp = n[i];
                   n[i] = n[j];
                   n[j] = tmp;
               }
           }
       }
       return n;
   }

   public static void printArray(int[] n) {
       System.out.println("\nPrinting the array");
       for (int i = 0; i < n.length; i++) {
           System.out.print(n[i] + " ");
       }
       System.out.println();
   }
}
```

13. Read an array and sort it in descending order.

```
import java.util.Scanner;

class QuestionThirteen {
   public static void main(String[] args) {
       int[] n = new int[10];
       Scanner s = new Scanner(System.in);

       for (int i = 0; i < n.length; i++) {
           System.out.print("Enter number " + (i + 1) + ": ");
           n[i] = s.nextInt();
       }
       printArray(n);
       n = sortDesc(n);
       printArray(n);
   }

   public static int[] sortDesc(int[] n) {
       for (int i = 0; i < n.length; i++) {
           for (int j = i + 1; j < n.length; j++) {
               if (n[j] > n[i]) {
                   int tmp = n[i];
                   n[i] = n[j];
                   n[j] = tmp;
               }
           }
       }
       return n;
   }

   public static void printArray(int[] n) {
       System.out.println("\nPrinting the array");
       for (int i = 0; i < n.length; i++) {
           System.out.print(n[i] + " ");
       }
       System.out.println();
   }
}
```

Two-Dimensional Arrays

1. **Read a 3x3 matrix and print it in reverse.**

```
import java.util.Scanner;

class QuestionOne {
   private static int[][] a = new int[3][3];

   public static void main(String[] args) {
       readMatrix();
       print();
       printInReverse();
   }

   private static void readMatrix() {
       System.out.println("\nRead a 3x3 matrix\n-------------");
       Scanner s = new Scanner(System.in);
       for (int i = 0; i < 3; i++) {
           for (int j = 0; j < 3; j++) {
               System.out.print("Enter number (" + i + "," + j + "): ");
               a[i][j] = s.nextInt();
           }
       }
   }

   private static void print() {
       System.out.println("\nPrinting\n-----------");
       for (int[] r : a) {
           for (int c : r) {
               System.out.print(c + "\t");
           }
           System.out.println();
       }
   }

   private static void printInReverse() {
       System.out.println("\nPrinting in reverse\n-----------");
       for (int i = 2; i >= 0; i--) {
           for (int j = 2; j >= 0; j--) {
               System.out.print(a[i][j] + "\t");
           }
           System.out.println();
       }
   }
}
```

2. Read a 3x3 matrix and find the sum of all elements.

```
import java.util.Scanner;

class QuestionTwo {
   private static int[][] a = new int[3][3];

   public static void main(String[] args) {
       readMatrix();
       printSum();
   }

   private static void readMatrix() {
       System.out.println("\nRead a 3x3 matrix\n-------------");
       Scanner s = new Scanner(System.in);
       for (int i = 0; i < 3; i++) {
           for (int j = 0; j < 3; j++) {
               System.out.print("Enter number (" + i + "," + j + "): ");
               a[i][j] = s.nextInt();
           }
       }
   }

   private static void printSum() {
       System.out.println("\nPrinting the sum\n-----------");
       int sum = 0;
       for (int[] r : a) {
           for (int c : r) {
               sum += c;
           }
       }
       System.out.println("The sum of array = " + sum);
   }
}
```

3. **Read a 3x3 matrix print the transpose of the matrix.**

```
import java.util.Scanner;

class QuestionThree {
   private static int[][] a = new int[3][3];

   public static void main(String[] args) {
       readMatrix();
       print();
       printTranspose();
   }

   private static void readMatrix() {
       System.out.println("\nRead a 3x3 matrix\n-------------");
       Scanner s = new Scanner(System.in);
       for (int i = 0; i < 3; i++) {
           for (int j = 0; j < 3; j++) {
               System.out.print("Enter number (" + i + "," + j + "): ");
               a[i][j] = s.nextInt();
           }
       }
   }

   private static void print() {
       System.out.println("\nPrinting\n-----------");
       for (int[] r : a) {
           for (int c : r) {
               System.out.print(c + "\t");
           }
           System.out.println();
       }
   }

   private static void printTranspose() {
       System.out.println("\nPrinting the transpose\n-----------");
       for (int i = 0; i < 3; i++) {
           for (int j = 0; j < 3; j++) {
               System.out.print(a[j][i] + "\t");
           }
           System.out.println();
       }
   }
}
```

4. **Read a 3x3 matrix find the sum of even elements and odd elements.**

```
import java.util.Scanner;

class QuestionFour {
   private static int[][] a = new int[3][3];

   public static void main(String[] args) {
       readMatrix();
       print();
       printEvenSum();
       printOddSum();
   }

   private static void readMatrix() {
       System.out.println("\nRead a 3x3 matrix\n-------------");
       Scanner s = new Scanner(System.in);
       for (int i = 0; i < 3; i++) {
           for (int j = 0; j < 3; j++) {
               System.out.print("Enter number (" + i + "," + j + "): ");
               a[i][j] = s.nextInt();
           }
       }
   }

   private static void print() {
       System.out.println("\nPrinting\n-----------");
       for (int[] r : a) {
           for (int c : r) {
               System.out.print(c + "\t");
           }
           System.out.println();
       }
   }

   private static void printEvenSum() {
       System.out.println("\nPrinting even sum\n-----------");
       int sum = 0;
       for (int[] r : a) {
           for (int c : r) {
               if (c % 2 == 0)
                   sum += c;
           }
       }
       System.out.println("Even sum = " + sum);
   }

   private static void printOddSum() {
       System.out.println("\nPrinting odd sum\n-----------");
```

```
        int sum = 0;
        for (int[] r : a) {
            for (int c : r) {
                if (c % 2 != 0)
                    sum += c;
            }
        }
        System.out.println("Odd sum = " + sum);
    }
}
```

5. **Read a 3x3 matrix find if a number is present or not.**

```
import java.util.Scanner;

class QuestionFive {
    private static int[][] a = new int[3][3];
    private static int needle;

    public static void main(String[] args) {
        readMatrix();
        print();
        readNeedle();
        check();
    }

    private static void readMatrix() {
        System.out.println("\nRead a 3x3 matrix\n-------------");
        Scanner s = new Scanner(System.in);
        for (int i = 0; i < 3; i++) {
            for (int j = 0; j < 3; j++) {
                System.out.print("Enter number (" + i + "," + j + "): ");
                a[i][j] = s.nextInt();
            }
        }
    }

    private static void readNeedle() {
        System.out.println("\nReading search number\n-----------");
        Scanner s = new Scanner(System.in);
        System.out.print("Enter search number: ");
        needle = s.nextInt();
    }

    private static void print() {
        System.out.println("\nPrinting\n-----------");
        for (int[] r : a) {
            for (int c : r) {
```

```
                System.out.print(c + "\t");
            }
            System.out.println();
        }
    }

    private static void check() {
        System.out.println("\nChecking if number is present or
not\n-----------");
        boolean found = false;
        for (int[] r : a) {
            for (int c : r) {
                if (c == needle) {
                    found = true;
                    break;
                }
                if (found)
                    break;
            }
        }
        if (found)
            System.out.println("Number " + needle + " found in array.");
        else
            System.out.println("Number " + needle + " NOT found in array.");
    }
}
```

6. Read two 3x3 matrices and then perform matrix addition.

```
import java.util.Scanner;

class QuestionSix {
    private static int[][] a = new int[3][3];
    private static int[][] b = new int[3][3];
    private static int[][] sum = new int[3][3];

    public static void main(String[] args) {
        a = readMatrix("A");
        b = readMatrix("B");
        print(a, "A");
        print(b, "B");
        findSum();
        print(sum, "Sum");
    }

    private static int[][] readMatrix(String name) {
        System.out.println("\nRead 3x3 matrix (" + name + ")\n-------------");
        int[][] num = new int[3][3];
```

```
        Scanner s = new Scanner(System.in);
        for (int i = 0; i < 3; i++) {
            for (int j = 0; j < 3; j++) {
                System.out.print("Enter number (" + i + "," + j + "): ");
                num[i][j] = s.nextInt();
            }
        }
        return num;
    }

    private static void print(int[][] num, String name) {
        System.out.println("\nPrinting (" + name + ")\n-----------");
        for (int[] r : num) {
            for (int c : r) {
                System.out.print(c + "\t");
            }
            System.out.println();
        }
    }

    private static void findSum() {
        System.out.println("\nFinding Sum...");
        for (int i = 0; i < 3; i++) {
            for (int j = 0; j < 3; j++) {
                sum[i][j] = a[i][j] + b[i][j];
            }
        }
    }
}
```

7. Read a 3x3 matrix and find the biggest and smallest elements.

```
import java.util.Scanner;

class QuestionSeven {
    private static int[][] a = new int[3][3];

    public static void main(String[] args) {
        readMatrix();
        biggestAndSmallest();
    }

    private static void readMatrix() {
        System.out.println("\nRead a 3x3 matrix\n-------------");
        Scanner s = new Scanner(System.in);
        for (int i = 0; i < 3; i++) {
            for (int j = 0; j < 3; j++) {
                System.out.print("Enter number (" + i + "," + j + "): ");
```

```
                a[i][j] = s.nextInt();
            }
        }
    }


    private static void biggestAndSmallest() {
        System.out.println("\nFinding biggest and smallest\n-----------");
        int biggest = a[0][0];
        int smallest = a[0][0];
        for (int[] r : a) {
            for (int c : r) {
                if (c > biggest)
                    biggest = c;
                if (c < smallest)
                    smallest = c;
            }
        }
        System.out.println("Biggest element: " + biggest);
        System.out.println("Smallest element: " + smallest);
    }
}
```

8. **Read a 3x3 matrix and find the diagonal sum.**

```
import java.util.Scanner;

class QuestionEight {
    public static void main(String[] args) {
        int[][] a = new int[3][3];
        int i, j, sum = 0;
        Scanner s = new Scanner(System.in);

        for (i = 0; i < a.length; i++) {
            for (j = 0; j < a[i].length; j++) {
                System.out.print("Enter number (" + i + "," + j + "): ");
                a[i][j] = s.nextInt();
            }
        }

        for (i = 0; i < a.length; i++) {
            for (j = 0; j < a[i].length; j++) {
                if (i == j) {
                    sum += a[i][j];
                }
                if ((a.length - 1) - i == j) {
                    if (i != j) {
                        sum += a[i][j];
```

```
                }
            }
        }
    }

        System.out.println("Diagonal sum is " + sum);
    }
}
```

9. Read two 3x3 matrices and then perform matrix subtraction.

```
import java.util.Scanner;

class QuestionSix {
    private static int[][] a = new int[3][3];
    private static int[][] b = new int[3][3];
    private static int[][] diff = new int[3][3];

    public static void main(String[] args) {
        a = readMatrix("A");
        b = readMatrix("B");
        print(a, "A");
        print(b, "B");
        findDifference();
        print(diff, "Sum");
    }

    private static int[][] readMatrix(String name) {
        System.out.println("\nRead 3x3 matrix (" + name + ")\n-------------");
        int[][] num = new int[3][3];
        Scanner s = new Scanner(System.in);
        for (int i = 0; i < 3; i++) {
            for (int j = 0; j < 3; j++) {
                System.out.print("Enter number (" + i + "," + j + "): ");
                num[i][j] = s.nextInt();
            }
        }
        return num;
    }

    private static void print(int[][] num, String name) {
        System.out.println("\nPrinting (" + name + ")\n-----------");
        for (int[] r : num) {
            for (int c : r) {
                System.out.print(c + "\t");
            }
            System.out.println();
        }
```

```
    }

    private static void findDifference() {
        System.out.println("\nFinding Sum...");
        for (int i = 0; i < 3; i++) {
            for (int j = 0; j < 3; j++) {
                diff[i][j] = a[i][j] + b[i][j];
            }
        }
    }
}
```

Strings

1. **Read a name and find the length.**

```
import java.util.Scanner;

class QuestionOne {
    public static void main(String[] args) {
        Scanner s = new Scanner(System.in);
        System.out.print("Enter a name: ");
        String name = s.nextLine();
        System.out.println("Length of '" + name + "' is " + name.length());
    }
}
```

2. **Read a name and convert to uppercase and lowercase.**

```
import java.util.Scanner;

class QuestionTwo {
    public static void main(String[] args) {
        Scanner s = new Scanner(System.in);
        System.out.print("Enter name: ");
        String name = s.nextLine();
        System.out.println("'" + name + "' in uppercase: " + name.toUpperCase());
        System.out.println("'" + name + "' in lowercase: " + name.toLowerCase());
    }
}
```

3. **Read a name and print the characters in reverse.**

```
import java.util.Scanner;

class QuestionThree {
   public static void main(String[] args) {
       Scanner s = new Scanner(System.in);
       System.out.print("Enter name: ");
       String name = s.nextLine();

       for (int i = name.length() - 1; i >= 0; i--) {
           System.out.print(name.charAt(i));
       }

       System.out.println();
   }
}
```

4. **Read a name and count vowels in it.**

```
import java.util.Scanner;

class QuestionFour {
   public static void main(String[] args) {
       Scanner s = new Scanner(System.in);
       System.out.print("Enter name: ");
       String name = s.nextLine();
       int count = 0;
       String vowels = "AEIOUaeiou";
       for (int i = 0; i < name.length(); i++) {
           if (vowels.indexOf(name.charAt(i)) != -1) {
               count++;
           }
       }

       System.out.println("Number of vowels in '" + name + "' is: " + count);
   }
}
```

5. **Read a name and find if a character is present or not.**

```
import java.util.Scanner;

class QuestionFive {
   public static void main(String[] args) {
       Scanner s = new Scanner(System.in);
       System.out.print("Enter name: ");
       String name = s.nextLine();
```

```
        System.out.print("Enter character to search: ");
        char letter = s.next().charAt(0);
        boolean found = false;
        for (int i = 0; i < name.length(); i++) {
            if (name.charAt(i) == letter) {
                found = true;
                break;
            }
        }
        if (found)
            System.out.println("Character '" + letter + "' is present in '" +
name + "'");
        else
            System.out.println("Character '" + letter + "' is NOT present in '" +
name + "'");
    }
}
```

6. **Read a name and count how many occurences of a character is there.**

```
import java.util.Scanner;

class QuestionSix {
    public static void main(String[] args) {
        Scanner s = new Scanner(System.in);
        System.out.print("Enter name: ");
        String name = s.nextLine();

        System.out.print("Enter character to search: ");
        char letter = s.next().charAt(0);
        int count = 0;
        for (int i = 0; i < name.length(); i++) {
            if (name.charAt(i) == letter) {
                count++;
            }
        }

        System.out.println("Character '" + letter + "' is present " + count + "
times in '" + name + "'");
    }
}
```

7. **Read 2 names and check if they are the same or not.**

```
import java.util.Scanner;

class QuestionSeven {
   public static void main(String[] args) {
       Scanner s = new Scanner(System.in);
       System.out.print("Enter a name: ");
       String name1 = s.nextLine();

       System.out.print("Enter another name: ");
       String name2 = s.nextLine();
       if (name1.compareTo(name2) == 0) {
           System.out.println("Names are same.");
       } else {
           System.out.println("Names are not same.");
       }
   }
}
```

8. **Read 3 names and check if they are the same or not.**

```
import java.util.Scanner;

class QuestionEight {
   public static void main(String[] args) {
       Scanner s = new Scanner(System.in);
       System.out.print("Enter a name: ");
       String name1 = s.nextLine();

       System.out.print("Enter another name: ");
       String name2 = s.nextLine();

       System.out.print("Enter a third name: ");
       String name3 = s.nextLine();
       if (name1.compareTo(name2) == 0 && name1.compareTo(name3) == 0) {
           System.out.println("Names are same.");
       } else {
           System.out.println("Names are not same.");
       }
   }
}
```

9. Read 3 names and check if they are the same or not, regardless of the case.

```
import java.util.Scanner;
class QuestionNine {
   public static void main(String[] args) {
       Scanner s = new Scanner(System.in);
       System.out.print("Enter a name: ");
       String name1 = s.nextLine();
       System.out.print("Enter another name: ");
       String name2 = s.nextLine();
       System.out.print("Enter a third name: ");
       String name3 = s.nextLine();
       if (name1.compareToIgnoreCase(name2) == 0 &&
name1.compareToIgnoreCase(name3) == 0) {
           System.out.println("Names are same.");
       } else {
           System.out.println("Names are not same.");
       }
   }
}
```

10. Read a name and find the index of a character.

```
import java.util.Scanner;
class QuestionTen {
   public static void main(String[] args) {
       Scanner s = new Scanner(System.in);
       System.out.print("Enter a name: ");
       String name = s.nextLine();
       System.out.print("Enter a letter: ");
       char letter = s.next().charAt(0);
       System.out.println("Index of '" + letter + "' in '" + name + "' is " +
name.indexOf(letter));
   }
}
```

11. Read 2 names and merge them.

```
import java.util.Scanner;
class QuestionEleven {
   public static void main(String[] args) {
       Scanner s = new Scanner(System.in);
       System.out.print("Enter a name: ");
       String name1 = s.nextLine();
       System.out.print("Enter another name: ");
       String name2 = s.nextLine();
       System.out.println("Full Name: " + name1.concat(" ").concat(name2));
   }
}
```

12. Read 3 names and merge them.

```
import java.util.Scanner;

class QuestionTwelve {
   public static void main(String[] args) {
        Scanner s = new Scanner(System.in);
        System.out.print("Enter a name: ");
        String name1 = s.nextLine();

        System.out.print("Enter another name: ");
        String name2 = s.nextLine();

        System.out.print("Enter a third name: ");
        String name3 = s.nextLine();

        System.out.println("Full Name: " + name1.concat("
").concat(name2).concat(" ").concat(name3));
   }
}
```

13. Read a name and replace a character with another.

```
import java.util.Scanner;

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

        System.out.print("Enter a name: ");
        String name = s.nextLine();

        System.out.print("Enter old character: ");
        char oldChar = s.next().charAt(0);

        System.out.print("Enter new character: ");
        char newChar = s.next().charAt(0);


        System.out.println("Replaced '" + oldChar + "' with '" + newChar + "'
from '" + name + "': " + name.replace(oldChar, newChar));
   }
}
```

File Management in Java

1. **Read a text of data from keyboard and copy to a file using FileOutputStream.**

```
import java.io.FileOutputStream;
import java.util.Scanner;

public class QuestionOne {
   public static void main(String[] args) {
       Scanner s = new Scanner(System.in);
       try {
           FileOutputStream fout = new FileOutputStream("q1.txt");
           System.out.print("Enter a text: ");
           String content = s.nextLine();
           fout.write(content.getBytes(), 0, content.length());
       } catch (Exception e) {
           System.out.println("Could not open file for writing");
       }
   }
}
```

2. **Read a file using FileInputStream and print the file contents.**

```
import java.io.FileInputStream;

public class QuestionTwo {
   public static void main(String[] args) {
       try {
           FileInputStream fin = new FileInputStream("q2.txt");
           StringBuilder sb = new StringBuilder();
           int ch;
           while ((ch = fin.read()) != -1) {
               sb.append((char) ch);
           }
           System.out.println(sb.toString());
       } catch (Exception e) {
           System.out.println("Could not open file for reading.");
       }
   }
}
```

3. **Copy a file to a new one using FileInputStream and FileOutputStream.**

```
import java.io.*;
import java.util.Scanner;

public class QuestionThree {
   public static void main(String[] args) {
       try {
           Scanner s = new Scanner(System.in);
           FileInputStream in = new FileInputStream("q3.txt");
           System.out.print("Enter new file name: ");
           String fileName = s.nextLine();
           FileOutputStream out = new FileOutputStream(fileName);
           int ch;
           while ((ch = in.read()) != -1) {
               out.write(ch);
           }
       } catch (FileNotFoundException e) {
           System.out.println("Could not open file for reading or writing");
       } catch (IOException e) {
           System.out.println("Could not get the contents of the file.");
       }
   }
}
```

4. **Read a text of data from keyboard and copy to a file using FileWriter class.**

```
import java.io.*;
import java.util.Scanner;

public class QuestionFour {
   public static void main(String[] args) {
       Scanner s = new Scanner(System.in);
       try {
           FileWriter fw = new FileWriter(new File("q4.txt"));
           System.out.print("Enter a text: ");
           String contents = s.nextLine();
           fw.write(contents);
           fw.close();
       } catch (IOException e) {
           System.out.println("Could not open file.");
       }
   }
}
```

5. Read a file using FileInputStream and count the vowels in it.

```
import java.io.*;
public class QuestionFive {
   public static void main(String[] args) {
       try {
           FileInputStream in = new FileInputStream("q5.txt");
           String vowels = "AEIOUaeiou";
           int ch, count = 0;
           while ((ch = in.read()) != -1) {
               if (vowels.indexOf(ch) != -1) {
                   count++;
               }
           }
           System.out.println("Count of vowels in file: " + count);
       } catch (FileNotFoundException e) {
           System.out.println("Could not open file.");
       } catch (IOException e) {
           System.out.println("Could not get the contents of the file.");
       }
   }
}
```

6. **Read a file using FileInputStream and search if a character is present or not.**

```
import java.io.*;
import java.util.Scanner;
public class QuestionSix {
   public static void main(String[] args) {
       try {
           FileInputStream in = new FileInputStream("q6.txt");
           int ch;
           Scanner s = new Scanner(System.in);
           System.out.print("Enter the character to search for: ");
           char letter = s.next().charAt(0);
           boolean found = false;
           while ((ch = in.read()) != -1) {
               if ((char) ch == letter) {
                   found = true;
                   break;
               }
           }
           if (found) System.out.println("Character '" + letter + "' found in
file");
           else System.out.println("Character '" + letter + "' NOT found in
file");
       } catch (FileNotFoundException e) {
           System.out.println("Could not open file.");
       } catch (IOException e) {
           System.out.println("Could not get the contents of the file.");
       }
   }
}
```

7. **Read a file using FileInputStream and find the length of the file.**

```
import java.io.*;
public class QuestionSeven {
   public static void main(String[] args) {
       try {
           FileInputStream in = new FileInputStream("q7.txt");
           int length = 0;
           while (in.read() != -1) {
               length++;
           }
           System.out.println("The length of the file is: " + length);
       } catch (FileNotFoundException e) {
           System.out.println("Could not open file.");
       } catch (IOException e) {
           System.out.println("Could not get the contents of the file.");
       }
   }
}
```

Inheritance

Person class

```
import java.util.Scanner;
class Person {
   private String name;
   private int age;
   private String address;
   protected Scanner s = new Scanner(System.in);
   public void readName() {
       s = new Scanner(System.in);
       System.out.print("Enter person name: ");
       name = s.nextLine();
   }
   public void readName(String name) {
       this.name = name;
   }
   public void readAge() {
       s = new Scanner(System.in);
       System.out.print("Enter person age: ");
       age = s.nextInt();
   }
   public void readAge(int age) {
       this.age = age;
   }
   public void readAddress() {
       s = new Scanner(System.in);
       System.out.print("Enter person address: ");
       address = s.nextLine();
   }
   public void readAddress(String address) {
       this.address = address;
   }
   public String getName() {
       return name;
   }
   public int getAge() {
       return age;
   }
   public String getAddress() {
       return address;
   }
   public void printInfo() {
       System.out.println("\n---------------------");
```

```
        System.out.println("Name: " + name);
        System.out.println("Age: " + age);
        System.out.println("Address: " + address);
        System.out.println("---------------------\n");
    }
}
```

Employee class

```
import java.util.Scanner;

class Employee extends Person {
   protected float salary;

   public void readSalary() {
        s = new Scanner(System.in);
        System.out.print("Enter employee salary: ");
        salary = s.nextFloat();
   }

   public void setValues() {
        super.readName();
        super.readAddress();
        super.readAge();
        readSalary();
   }

   public Float getSalary() {
        return salary;
   }

   public void printInfo() {
        System.out.println("\n---------------------");
        System.out.println("Name: " + getName());
        System.out.println("Age: " + getAge());
        System.out.println("Address: " + getAddress());
        System.out.println("Salary: " + salary);
        System.out.println("---------------------\n");
   }
}
```

Teacher class

```
import java.util.Scanner;

class Teacher extends Employee {
   protected String subject;

   public void readSubject() {
       s = new Scanner(System.in);
       System.out.print("Enter subject: ");
       subject = s.nextLine();
   }

   public void setValues() {
       super.setValues();
       readSubject();
   }

   public String getSubject() {
       return subject;
   }

   public void printInfo() {
       System.out.println("\n---------------------");
       System.out.println("Name: " + getName());
       System.out.println("Age: " + getAge());
       System.out.println("Address: " + getAddress());
       System.out.println("Salary: " + salary);
       System.out.println("Subject: " + subject);
       System.out.println("---------------------\n");
   }
}
```

Student class

```
import java.util.Scanner;

class Student extends Person {
   protected String gradeClass;

   public void readGradeClass() {
       s = new Scanner(System.in);
       System.out.print("Enter grade class: ");
       gradeClass = s.nextLine();
   }

   public void setValues() {
```

```
        s = new Scanner(System.in);
        System.out.print("Enter student name: ");
        super.readName(s.nextLine());
        s = new Scanner(System.in);
        System.out.print("Enter student age: ");
        super.readAge(s.nextInt());
        s = new Scanner(System.in);
        System.out.print("Enter student address: ");
        super.readAddress(s.nextLine());
        readGradeClass();
    }

    public String getGradeClass() {
        return gradeClass;
    }

    public void printInfo() {
        System.out.println("\n---------------------");
        System.out.println("Name: " + getName());
        System.out.println("Age: " + getAge());
        System.out.println("Address: " + getAddress());
        System.out.println("Class: " + gradeClass);
        System.out.println("---------------------\n");
    }
}
```

Main class

```
class Main {
    public static void main(String[] args) {
        Employee e = new Employee();
        e.setValues();
        e.printInfo();

        Teacher t = new Teacher();
        t.setValues();
        t.printInfo();

        Student s = new Student();
        s.setValues();
        s.printInfo();
    }
}
```

1. **Single inheritance java example**
   Employee inherits from *Person* by extending from *Person* class.

2. **Multi-level inheritance java example**
   Teacher extends *Employee* and *Employee* extends *Person*.

3. **Hybrid inheritance java example**
   Both *Employee* and *Student* have the same parent class (*Person*) because those classes extend the *Person* class.

4. **Method overloading java example**
   Person class overloads methods *readName()*, *readAge()* and *readAddress()*. There are 2 versions of each of those methods. One is to read directly from user input and the other version accepts a value as an argument of the relevant type.

5. **Method overriding java example**
   - *Employee* class and *Student* class override *printInfo()* method from *Person* class.
   - *Teacher* class overrides *printInfo()* method from *Employee* class.
   - *Teacher* class overrides *setValues()* method from *Employee* class.

Special (For me)

1. **Read an array and sort in descending order.**

```
import java.util.Scanner;
class QuestionOne {
    public static void main(String[] args) {
        int[] n = new int[10];
        Scanner s = new Scanner(System.in);

        for (int i = 0; i < n.length; i++) {
            System.out.print("Enter number " + (i + 1) + ": ");
            n[i] = s.nextInt();
        }
        printArray(n);
        n = sortDesc(n);
        printArray(n);
    }

    public static int[] sortDesc(int[] n) {
        for (int i = 0; i < n.length; i++) {
            for (int j = i + 1; j < n.length; j++) {
                if (n[j] > n[i]) {
                    int tmp = n[i];
                    n[i] = n[j];
                    n[j] = tmp;
                }
            }
        }
        return n;
    }

    public static void printArray(int[] n) {
        System.out.println("\nPrinting the array");
        for (int i = 0; i < n.length; i++) {
            System.out.print(n[i] + " ");
        }
        System.out.println();
    }
}
```

2. Read an array of integers and find the biggest and smallest number.

```
import java.util.Scanner;
class QuestionTwo {
    public static void main(String[] args) {
        int[] nums = new int[10];
        Scanner s = new Scanner(System.in);

        for (int i = 0; i < nums.length; i++) {
            System.out.print("Enter number " + (i + 1) + ":");
            nums[i] = s.nextInt();
        }
        System.out.println();
        biggest(nums);
        smallest(nums);
    }

    public static void biggest(int[] nums) {
        int biggest = 0;
        for (int i = 0; i < nums.length; i++) {
            if (nums[i] > biggest) biggest = nums[i];
        }
        System.out.println("Biggest number: " + biggest);
    }

    public static void smallest(int[] nums) {
        int smallest = 0;

        for (int i = 0; i < nums.length; i++) {
            if (i == 0) smallest = nums[i];
            if (nums[i] < smallest) smallest = nums[i];
        }
        System.out.println("Smallest number: " + smallest);
    }
}
```

3. **Read an array. Delete a number from a location. Print the balance.**

```
import java.util.Scanner;
class QuestionThree {
   private static final int MAX = 10;

   public static void main(String[] args) {
       int[] nums = new int[MAX];
       int location;
       Scanner s = new Scanner(System.in);

       for (int i = 0; i < nums.length; i++) {
           System.out.print("Enter number " + (i + 1) + ": ");
           nums[i] = s.nextInt();
       }

       displayArray(nums);

       System.out.print("Enter location to delete: ");
       location = s.nextInt();

       for (int i = location; i < nums.length; i++) {
           if (i == nums.length - 1) nums[i] = 0;
           else nums[i] = nums[i + 1];
       }

       System.out.println("\nNew values");

       displayArray(nums);
   }

   public static void displayArray(int[] nums) {
       for (int i = 0; i < nums.length; i++) {
           if (nums[i] != 0) System.out.print(nums[i] + " ");
       }
       System.out.println("\n");
   }
}
```

4. **Read array, insert a number to a specified position.**

```
import java.util.Scanner;
class QuestionFour {
    private static final int MAX = 10;
    public static void main(String[] args) {
        int[] n = new int[100];
        int location, newNum;
        Scanner s = new Scanner(System.in);

        for (int i = 0; i < MAX; i++) {
            System.out.print("Enter number " + (i + 1) + ": ");
            n[i] = s.nextInt();
        }
        printArray(n);

        System.out.print("Enter location: ");
        location = s.nextInt();

        System.out.print("Enter new number: ");
        newNum = s.nextInt();

        int tmp;

        for (int i = MAX; i >= location; i--) {
            n[i+1] = n[i];
            if (i == location) n[i] = newNum;
        }

        printArray(n);
    }

    public static void printArray(int[] n) {
        System.out.println("\nPrinting the array\n---------------");
        for (int i = 0; i < n.length; i++) {
            if (n[i] != 0) System.out.print(n[i] + " ");
        }
        System.out.println();
    }
}
```

5. **Read a 3x3 matrix and generate a 4x4 matrix with the last row and column containing the sums of corresponding elements.**

```
import java.util.Scanner;
class QuestionFive {
    public static void main(String[] args) {
        int[][] n = new int[3][3];
        int[][] sums = new int[4][4];
        Scanner s = new Scanner(System.in);
        for (int i = 0; i < n.length; i++) {
            for (int j = 0; j < n[i].length; j++) {
                System.out.print("Enter number (" + i + ", " + j + "): ");
                n[i][j] = s.nextInt();
            }
        }

        printArray(n);
        System.out.println("\nCalculating sums ...");
        for (int i = 0; i < n.length; i++) {
            for (int j = 0; j < n[i].length; j++) {
                sums[i][j] = n[i][j];
                sums[i][3] += n[i][j];
            }
        }

        for (int i = 0; i < n.length; i++) {
            for (int j = 0; j < n[i].length; j++) {
                sums[3][i] += n[j][i];
            }
            if (i < 3) {
                sums[3][3] += sums[i][3];
                sums[3][3] += sums[3][i];
            }
        }

        printArray(sums);
    }

    public static void printArray(int[][] n) {
        System.out.println("\n\nPrinting Array\n--------------");
        for (int i = 0; i < n.length; i++) {
            for (int j = 0; j < n[i].length; j++) {
                System.out.print(n[i][j] + "\t");
            }
            System.out.println();
        }
    }
}
```

6. **Check if a matrix is unitary or not.**

```
import java.util.Scanner;
class QuestionSix {
   public static void main(String[] args) {
       // to do this, first I need to learn some mathematics
   }
}
```

7. **Matrix multiplication.**

```
import java.util.Scanner;
class QuestionSeven {
   private static final int SIZE = 3;
   private static int[][] a = new int[SIZE][SIZE];
   private static int[][] b = new int[SIZE][SIZE];
   private static int[][] c = new int[SIZE][SIZE];

   public static void main(String[] args) {
       System.out.println("Reading matrix A");
       a = readMatrix();

       System.out.println("Reading matrix B");
       b = readMatrix();

       printMatrix(a, "A");
       printMatrix(b, "B");

       initProductMatrix();
       multiply();
       printMatrix(c, "C");
   }

   private static int[][] readMatrix() {
       Scanner s = new Scanner(System.in);
       int[][] n = new int[SIZE][SIZE];
       for (int i = 0; i < SIZE; i++) {
           for (int j = 0; j < SIZE; j++) {
               System.out.print("Enter number (" + i + "," + j + "):");
               n[i][j] = s.nextInt();
           }
       }
       return n;
   }

   private static void printMatrix(int[][] m, String name) {
       System.out.println("\nPrinting matrix " + name + "\n-----------------");
       for (int[] row: m) {
           for (int col: row) {
```

```
                System.out.print(col + "\t");
            }
            System.out.println();
        }
    }

    private static void multiply() {
        for (int i = 0; i < SIZE; i++) {
            int r = i % SIZE;
            for (int j = 0; j < SIZE; j++) {
                for (int k = 0; k < SIZE; k++) {
                    c[i][j] = c[i][j] + (a[i][k] * b[k][j]);
                }
            }
        }
    }

    private static void initProductMatrix() {
        for (int i = 0; i < SIZE; i++) {
            for (int j = 0; j < SIZE; j++) {
                c[i][j] = 1;
            }
        }
    }
}
```