Data Structure and Algorithm
Basic Programming

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Questions

1.

```
import java.util.Scanner;

public class ConditionalProblem {
    static Scanner input = new Scanner(System.in);
    static double ASSIGNMENT_FACTOR = 0.2;
    static double MIDTERM_FACTOR = 0.35;
    static double FINAL_EXAM_FACTOR = 0.45;

    public static void main(String[] args) {

        System.out.println("Final Score Calculator");
        System.out.println("======================");
        int assignmentScore = getIntValue("Input your assignemnt score: ");
        int midTermScore = getIntValue("Input your midterm score: ");
        int finalExamScore = getIntValue("Input your final exam score: ");
        System.out.println("======================");
        double finalScore = (ASSIGNMENT_FACTOR * assignmentScore)
                + (MIDTERM_FACTOR * midTermScore)
                + (FINAL_EXAM_FACTOR * finalExamScore);
        String convertedScore = convertScore(finalScore);
        System.out.printf("Final score: %.2f", finalScore);
        System.out.printf("Grade: %s", convertedScore);
        System.out.println("======================");
        if (convertedScore.equals("A")
                || convertedScore.equals("B+")
                || convertedScore.equals("B")
                || convertedScore.equals("C+")
                || convertedScore.equals("C+")) {
            System.out.println("Congratulations! You passed!");
        } else {
            System.out.println("Unfortunately you failed.");
        }
    }

    private static int getIntValue(String prompt) {
        while (true) {
            System.out.print(prompt);
            String value = input.next();
            if (!value.isEmpty()) {
                int intValue = Integer.parseInt(value);
                if (intValue >= 0 && intValue <= 100) {
                    return intValue;
                }
```

```java
            }
            System.out.println(
                "Please insert the correct value, must be from 0 to 100!"
            );
        }
    }

    private static String convertScore(double score) {
        if (score > 80 && score <= 100) return "A";
        if (score > 73 && score <= 80) return "B+";
        if (score > 65 && score <= 73) return "B";
        if (score > 60 && score <= 65) return "C+";
        if (score > 50 && score <= 60) return "C";
        if (score > 39 && score <= 50) return "D";
        return "E";
    }
}
```

2.

```java
import java.util.Scanner;

public class LoopProblem {
    static Scanner input = new Scanner(System.in);
    static int NIM_LIMIT = 10;
    static String[] DAYS = {
            "SUNDAY",
            "MONDAY",
            "TUEDAYS",
            "WEDNESDAY",
            "THURSDAY",
            "FRIDAY",
            "SATURDAY"
    };

    public static void main(String[] args) {
        String nim = getNIM("Insert your NIM: ");
        int repeatAmount = getLastTwoDigit(nim);
        for (int i = 0; i < repeatAmount; i++) {
            System.out.printf("%s ", DAYS[i % 7]);
        }
    }

    private static String getNIM(String prompt) {
        while (true) {
            System.out.print(prompt);
            String nim = input.next();
            if (nim.length() < NIM_LIMIT) {
                System.out.println(
                    "Your NIM should be at least have a length of 10"
                );
                continue;
            }

            // every character should be a number
            boolean isValid = true;
            for (int i = 0; i < nim.length(); i++) {
                if (Character.isAlphabetic(nim.charAt(i))) {
                    isValid = false;
                }
            }
            if (!isValid) {
                System.out.println("Your NIM cannot contain any alphabet!");
                continue;
            }

            return nim;
        }
    }

    private static int getLastTwoDigit(String nim) {
        String lastTwoDigit = nim.substring(nim.length() - 2, nim.length());
        int value = Integer.parseInt(lastTwoDigit);
        return value < 10 ? value + 10 : value;
    }
}
```

3.
```
public class ArrayProblem {
    static String[] FLOWER_KINDS = {
            "Aglaonema",
            "Taro",
            "Alocasia",
            "Rose"
    };
    static int[][] STOCK_BY_BRANCH = {
            // Aglaonema - Taro - Alocasia - Rose
            { 10, 5, 15, 7 }, // Royal Garden 1
            { 6, 11, 9, 12 }, // Royal Garden 2
            { 2, 10, 10, 5 }, // Royal Garden 3
            { 5, 7, 12, 9 }, // Royal Garden 4
    };
```

```
static int[] FLOWER_PRICES = {
        75_000, // Aglaonema
        50_000, // Taro
        60_000, // Alocasia
        10_000 // Rose
};

public static void main(String[] args) {
    int[] branchesStock = countStockAcrossBranches(STOCK_BY_BRANCH);
    for (int flowerId = 0; flowerId < branchesStock.length; flowerId++) {
        System.out.printf(
                "Stock for %s: %d\n",
                FLOWER_KINDS[flowerId],
                branchesStock[flowerId]);
    }
    System.out.println("====================");
    int income = countIncomeForBranch(0, new int[] { 1, 2, 5, 0 });
    System.out.printf("Income for Royal Garden 1 is: %d", income);
}

private static int[] countStockAcrossBranches(int[][] stock) {
    int[] branchesStock = new int[4];
    for (int branchId = 0; branchId < stock.length; branchId++) {
        int branchStocks = stock[branchId].length;
        for (int flowerId = 0; flowerId < branchStocks; flowerId++) {
            branchesStock[branchId] += stock[branchId][flowerId];
        }
    }
    return branchesStock;
}

private static int countIncomeForBranch(int branchId, int[] lossDetail) {
    if (lossDetail.length != FLOWER_KINDS.length) {
        System.out.println(
            "Loss detail can't be less than the types of the flower"
        );
        System.exit(1);
    }
    int income = 0;
    for (int stock : STOCK_BY_BRANCH[branchId]) {
        for (int flowerId = 0; flowerId < lossDetail.length; flowerId++) {
            int flowerIncome =
                (stock - lossDetail[flowerId]) * FLOWER_PRICES[flowerId];
            income += flowerIncome;
        }
        }
        return income;
    }
}
```

4.

```
public class Fibonacci {
    public static void main(String[] args) {
        String recursiveFibonacciRow = getFibonacciRow("recursive", 9);
        System.out.println("Fibonacci using recursion: " + recursiveFibonacciRow);

        String loopFibonacciRow = getFibonacciRow("loop", 9);
        System.out.println("Fibonacci using recursion: " + loopFibonacciRow);
    }

    private static String getFibonacciRow(String type, int limit) {
        int[] fibonacciNumbers = new int[limit];
        if (type == "recursive") {
            for (int i = 0; i < limit; i++) {
                fibonacciNumbers[i] = recursiveFibonacci(i);
            }
        } else if (type == "loop") {
            for (int i = 0; i < limit; i++) {
                fibonacciNumbers[i] = loopFibonacci(i);
            }
        }

        String row = "";
        for (int i = 0; i < fibonacciNumbers.length; i++) {
            row += fibonacciNumbers[i];
            if (i != fibonacciNumbers.length - 1) {
                row += ", ";
            }
        }
        return row;
    }

    private static int recursiveFibonacci(int n) {
        return n > 1
                ? recursiveFibonacci(n - 1) + recursiveFibonacci(n - 2)
                : n;
    }

    private static int loopFibonacci(int n) {
        int x = 1;
        int y = 0;
        int result = 0;

        while (n > 0) {
            result = x;
            x = x + y;
            y = result;
            n--;
        }

        return result;
    }
}
```

Assignment

1.
   ```
   public class Laundry {
       static int PRICE = 4_500;
       static double DISCOUNT = 0.05;
       // Ani - Budi - Bina - Cita
       static int[] CUSTOMERS = { 4, 15, 6, 11 };

       public static void main(String[] args) {
           int income = 0;
           for (int weight : CUSTOMERS) {
               income += weight > 10 ? (weight * PRICE) * DISCOUNT : weight * PRICE;
           }
           System.out.println("The total income for Smile Laundry is: " + income);
       }
   }
   ```

2.
   ```
   public class Interest {
       static int INITIAL_BALANCE = 1_000_000;
       static int TARGET_BALANCE = 1_500_000;
       static double INTEREST = 1.02;

       public static void main(String[] args) {
           int monthCount = 0;
           int balance = INITIAL_BALANCE;
           while (balance <= TARGET_BALANCE) {
               balance *= INTEREST;
               if (balance >= TARGET_BALANCE) {
                   continue;
               }
               monthCount++;
   ```

```
        };
        System.out.printf(
            "The balance reached the target after %d months\n",
            monthCount
        );
    }
}
```

3.

```
import java.util.Scanner;

public class Menu {
    static Scanner input = new Scanner(System.in);

    public static void main(String[] args) {
        int chosenMenu = chooseMenu();
        switch (chosenMenu) {
            case 1:
                calculateTriangleArea();
                break;
            case 2:
                calculateRectangleArea();
                break;
            case 3:
                calculateCircleArea();
                break;
            default:
                System.out.println("Invalid Menu");
                break;
        }
    }

    public static int chooseMenu() {
        System.out.println("1. Calculate area of triangle");
        System.out.println("2. Calculate area of rectangle");
        System.out.println("3. Calculate area of circle");
        System.out.print("Choose menu: ");
        return input.nextInt();
    }

    public static void calculateTriangleArea() {
        System.out.print("Insert the base width: ");
        int base = input.nextInt();
        System.out.print("Insert the height: ");
        int height = input.nextInt();
        double area = (base / 2) * height;
```

```java
        System.out.printf("The area of the triangle is: %.2f\n", area);
    }

    public static void calculateRectangleArea() {
        System.out.print("Insert the length: ");
        int length = input.nextInt();
        System.out.print("Insert the height: ");
        int height = input.nextInt();
        double area = length * height;
        System.out.printf("The area of the rectangle is: %.2f\n", area);
    }

    public static void calculateCircleArea() {
        System.out.print("Insert the radius: ");
        int radius = input.nextInt();
        double area = Math.PI * radius * radius;
        System.out.printf("The area of the circle: %.2f\n", area);
    }
}
```