Solutions to the all exercise questions

Exercise: 01

Answer to the question no. 1

```
public class E1Q1 {
    public static void main(String[] args) {
        int number = 10;
        double pi = 3.14;
        boolean flag = true;
        String name = "Nader";
        System.out.println("Number: " + number);
        System.out.println("Pi: " + pi);
        System.out.println("Flag: " + flag);
        System.out.println("Name: " + name);
    }
}
```

Explanation: We have declared and initialized variables of different data types: number of type **int**, pi of type **double**, flag of type **boolea**n, and name of type **String**. We have also used the **System.out.println()** method to display the values of the variables.

Expected Output (Verified):

```
Number: 10
Pi: 3.14
Flag: true
Name: Nader
```

Answer to the question no. 2

2. Program to calculate the area of a rectangle:

```
import java.util.Scanner;

public class E1Q2 {
```

```
public static void main(String[] args) {
Scanner input = new Scanner(System.in);

System.out.print("Enter the length: ");
double length = input.nextDouble();
System.out.print("Enter the width: ");
double width = input.nextDouble();
double area = length * width;
System.out.println("The area of the rectangle is: " + area);
}
}
```

Explanation: To read input from the user, we import the **Scanner** class. Next, we create a **Scanner** object named **input** to obtain user input. Using **System.out.print()** statements, we prompt the user to enter the length and width of the rectangle. The user's input is read as **double** values using **input.nextDouble()**, which are then stored in variables named **length** and **width**. To calculate the area of the rectangle, **we will multiply the values of length and width**, and store the result in a variable called **area**. Finally, we use **System.out.println()** to display the calculated area to the user.

Expected Output (Verified):

```
Enter the length: 8
Enter the width: 6
The area of the rectangle is: 48.0
```

Answer to the question no. 3

3. Program to convert temperature from Celsius to Fahrenheit:

```
import java.util.Scanner;

public class E1Q3 {
   public static void main(String[] args) {
      Scanner input = new Scanner(System.in);

      System.out.print("Enter the temperature in Celsius: ");
      double celsius = input.nextDouble();

      double fahrenheit = (celsius * 9 / 5) + 32;
      System.out.println("Temperature in Fahrenheit: " + fahrenheit);
   }
}
```

Explanation: In order to read input from the user, we have imported the **Scanner** class. To accomplish this, we have created a **Scanner** object named **input**. Using the **System.out.print()** statement, we prompt the user to **enter the temperature in Celsius**. The user's input is then read as a **double** value using **input.nextDouble()** and stored in the variable **celsius**. To convert the temperature from Celsius to Fahrenheit, we have applied the formula **(celsius * 9 / 5) + 32** and store the result in the variable **fahrenheit**. Finally, we display the converted temperature in Fahrenheit using **System.out.println()**.

Expected Output (Verified):

```
Enter the temperature in Celsius: 36
Temperature in Fahrenheit: 96.8
```

Answer to the question no. 4

4. Program to check if a given number is even or odd:

```
import java.util.Scanner;

public class E1Q4 {
   public static void main(String[] args) {
      Scanner input = new Scanner(System.in);

      System.out.print("Enter a number: ");
      int number = input.nextInt();

      if (number % 2 == 0) {
         System.out.println("The number is even.");
      } else {
         System.out.println("The number is odd.");
      }
   }
}
```

Explanation: To read input from the user, we import the **Scanner** class. Next, we have created a **Scanner** object named **input** to retrieve user input. Using the **System.out.print()** statement, we prompt the user **to enter a number**. The user's input is then read as an **int** value using **input.nextInt()** and stored in the **number** variable. To determine if the number is even or odd, we employ an **if-else** statement. **If the remainder of the number divided by 2 is 0, it is considered even; otherwise, it is classified as odd**. Lastly, we utilize **System.out.println()** to display the result.

Answer to the question no. 5

5. Program to concatenate two strings:

```
import java.util.Scanner;

public class E1Q5 {
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);

        System.out.print("Enter the first string: ");
        String firstString = input.nextLine();

        System.out.print("Enter the second string: ");
        String secondString = input.nextLine();

        String concatenatedString = firstString + secondString;
        System.out.println("Concatenated string: " + concatenatedString);
    }
}
```

Explanation: In order to read input from the user, we import the **Scanner** class. We then proceed to create a **Scanne**r object named **input** to obtain user input. To prompt the user, we use **System.out.print()** statements, requesting the user to enter the first and second strings. To read the user's input as **String** values, we utilize **input.nextLine()** and store them in the variables **firstString** and **secondString**. Then using the **+** operator, we concatenate the two strings and assign the result to the variable **concatenatedString**. Lastly, we display the concatenated string by making use of **System.out.println()**.

Expected Output (Verified):

```
Enter the first string: Nader
Enter the second string: Khan
Concatenated string: NaderKhan
```

Exercise: 02

1. Program to sum three numbers:

Answer to the question no. 1

```
import java.util.Scanner;

public class E2Q1 {
    public static void main(String[] args) {
```

```
        Scanner scanner = new Scanner(System.in);

        System.out.println("Enter the first number:");
        int num1 = scanner.nextInt();

        System.out.println("Enter the second number:");
        int num2 = scanner.nextInt();

        System.out.println("Enter the third number:");
        int num3 = scanner.nextInt();

        int sum = num1 + num2 + num3;

        System.out.println("The sum of the three numbers is: " + sum);
    }
}
```

Explanation: To start the program, the **Scanner** class from the **java.util** package is imported, enabling the program to read user input. The subsequent step involves defining the **E2Q1** class, which houses the main method responsible for the program's execution. Within the main method, a new **Scanner** object, named **scanner**, is instantiated to facilitate user input reading. The program proceeds to prompt the user for the first number, reading and storing it in the variable **num1**. This process is repeated for the second and third numbers, which are stored in **num2** and **num3**, respectively. The sum of these three numbers is calculated and stored in the variable **sum**. Finally, the program utilizes the **System.out.println()** method to display the sum to the user.

Expected Output (Verified):

```
Enter the first number:
9
Enter the second number:
6
Enter the third number:
5
The sum of the three numbers is: 20
```

Answer to the question no. 2

2. Program to greet the user with "Have a great day!":

```
import java.util.Scanner;

public class E2Q2 {
```

```
public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        System.out.println("Enter your name:");
        String name = scanner.nextLine();

        System.out.println("Have a great day, " + name + "!");
    }
}
```

Explanation: This program begins by importing the **Scanner** class, just like before. Then, we have defined a class called **E2Q2**, which has the main method inside it. Inside this main method, a new object of the **Scanner** class is created and named **scanner**. This object is used to read the input provided by the user. The program asks the user to enter their name and uses the **nextLine()** method of the scanner object to read the input. The name is then stored in a variable called **name**. Finally, the program uses the **System.out.println()** method to display a greeting message to the user.

Expected Output (Verified):

```
Enter your name:
Nader
Have a great day, Nader!
```

Exercise: 03

Answer to the question no. 1

```
public class E3Q1 {
    public static void main(String[] args) {
        double x = 7/4 * 9/2;
        System.out.println("Result: " + x);
    }
}
```

Explanation: In the program, we are assigning the result of a mathematical calculation to the variable **x**. The expression involves integer division and multiplication, which have specific rules in Java. The division operator **(/)** when used with integers performs **integer division**, where the **fractional part is truncated**. The multiplication operator **(*)** performs the multiplication operation. Finally, the result is assigned to a **double variable x,** which means it will store the result as a floating-point number and display it using **System.out.println()** method.

Expected Output (Verified):

```
Result: 4.0
```

Answer to the question no. 2

```
import java.util.Scanner;

public class E3Q2 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter the value of u: ");
        double u = scanner.nextDouble();

        System.out.print("Enter the value of g: ");
        double g = scanner.nextDouble();

        System.out.print("Enter the value of h: ");
        double h = scanner.nextDouble();

        double vSquared = (u * u) + (2 * g * h);

        System.out.println("The value of v² is: " + vSquared);
    }
}
```

Explanation: In the following code, we have imported the **Scanner** class for user input. Then, we have created a new instance of Scanner to read the user's input. We have prompted the user to enter the value of "u" (initial velocity) by displaying a message using **System.out.print()**. Using **scanner.nextDouble()**, we read the input provided by the user and store it in the variable "**u**". We repeat the same process for "**g**" (acceleration due to gravity) and "**h**" (height) using the same steps as above. After that, we have to calculate "v^2" using a specific formula. Finally, we print the result to the terminal using **System.out.println()**.

Expected Output (Verified):

```
Enter the value of u: 8
Enter the value of g: 7
Enter the value of h: 12
The value of v² is: 232.0
```

Exercise: 04

Answer to the question no. 1

```
import java.util.Scanner;

public class E4Q1 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter a string: ");
        String input = scanner.nextLine();

        String lowercase = input.toLowerCase();

        System.out.println("Lowercase: " + lowercase);

        scanner.close();
    }
}
```

Explanation: We begin by importing the **Scanner** class from the **java.util** package, which enables us to read user input. Next, we declare a public class named **E4Q1**. Inside the main method, we create a new instance of **Scanner** and assign it to the variable **scanner**. We prompt the user to enter a string by using **System.out.print()** to display the message **Enter a string:** . We utilize the **nextLine()** method of the Scanner class to read the user input and store it in the variable "**input**". We convert the input string to lowercase using the **toLowerCase()** method and assign the result to the variable **lowercase**. Finally, we use **System.out.println()** to display the lowercase string.

Expected Output (Verified):

```
Enter a string: Hi There
Lowercase: hi there
```

Answer to the question no. 2

```
public class E4Q2{
    public static void main(String[] args) {
        String input = "Hello World! This is a sample string.";
        String replaced = input.replace(" ", "_");
```

```
        System.out.println("Replaced: " + replaced);
    }
}
```

Explanation: In the program, we have declareed a public class named **E4Q2**. Inside the main method, we have created a string variable named "**input**" and assign it the value **Hello World! This is a sample string.** We use the **replace()** method of the **String** class **to replace all occurrences of a space (" ") with an underscore ("_")**.The resulting modified string is stored in the variable called **replaced**. Finally, we used **System.out.println()** to display the replaced string.

Expected Output (Verified):

```
Replaced: Hello_World!_This_is_a_sample_string.
```

Answer to the question no. 3

```
public class E4Q3 {
    public static void main(String[] args) {
        String recipient = "Nader";
        String handbook = "Java Handbook";
        String sender = "Raafi";

        String letter = "Dear " + recipient + ",\n\nThanks for your awesome " + handbook + ".\n\
nYours ever,\n" + sender;

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

Explanation: In the program, we declared a public class called **E4Q3**. In the main method, we created string variables for the **recipient**, **handbook**, and **sender**. To represent new lines in the letter, we used the **escape sequence character \n**. By concatenating the strings and adding the escape sequences, we created the formatted letter. Lastly, we used **System.out.println()** to display the formatted letter.

Expected Output (Verified):

```
Dear Nader,

Thanks for your awesome Java Handbook.

Yours ever,
```

Raafi

Exercise: 05

Answer to the question no. 1

```
import java.util.Scanner;

public class E5Q1 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter a number: ");
        int number = scanner.nextInt();

        if (number > 0) {
            System.out.println("The number is positive.");
        } else if (number < 0) {
            System.out.println("The number is negative.");
        } else {
            System.out.println("The number is zero.");
        }
    }
}
```

Explanation:

- We import the **java.util.Scanner** package to read input from the user.
- We define a class named **E5Q1**.
- Inside the main method, we create a **Scanner** object to read user input.
- We prompt the user to enter a number and store it in the **number** variable.
- We use an **if-else statement** to check if the number is positive, negative, or zero.
- **If the number is greater than 0**, we print "**The number is positive.**"
- **If the number is less than 0**, we print "**The number is negative.**"
- **If the number is 0**, we print "**The number is zero.**"

The program ends.

Expected Output (Verified):

```
Enter a number: -9
The number is negative.
```

Answer to the question no. 2

```
import java.util.Scanner;

public class E5Q2 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter a year: ");
        int year = scanner.nextInt();

        boolean isLeapYear = false;

        if (year % 4 == 0) {
            if (year % 100 == 0) {
                if (year % 400 == 0) {
                    isLeapYear = true;
                }
            } else {
                isLeapYear = true;
            }
        }

        if (isLeapYear) {
            System.out.println(year + " is a leap year.");
        } else {
            System.out.println(year + " is not a leap year.");
        }
    }
}
```

Explanation:

1. We import the **java.util.Scanner** package to read input from the user.
2. We define a class named **E5Q2**.
3. Inside the main method, we create a **Scanner object** to read user input.
4. We prompt the user to enter a year and store it in the **year** variable.
5. We initialize a boolean variable **isLeapYear** as **false**.
6. We use **nested if-else statements to check if the year is a leap year**.
7. If the year is divisible by **4**, we continue to the next step.
8. If the year is divisible by **100,** we check if it's also divisible by **400**. If true, **it's a leap year**.
9. If the year is not divisible by 100, **it's a leap year**.
10. If isLeapYear is **true**, we print that **the year is a leap year.**
11. If isLeapYear is **false**, we print that **the year is not a leap year**.
12. The program ends.

Expected Output (Verified):

```
Enter a year: 2023
2023 is not a leap year.
```

Answer to the question no. 3

```
import java.util.Scanner;

public class E5Q3 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter the first number: ");
        int num1 = scanner.nextInt();

        System.out.print("Enter the second number: ");
        int num2 = scanner.nextInt();

        System.out.print("Enter the third number: ");
        int num3 = scanner.nextInt();

        int largestNumber;
        if (num1 > num2) {
        if (num1 > num3) {
            largestNumber = num1;
        } else {
            largestNumber = num3;
        }
        } else {
        if (num2 > num3) {
            largestNumber = num2;
        } else {
            largestNumber = num3;
        }
        }

        System.out.println("The largest number is: " + largestNumber);
    }
}
```

Explanation:

1. We import the **java.util.Scanner** package to read input from the user.
2. We define a class named **E5Q3**.
3. Inside the main method, we create a **Scanner object** to read user input.
4. We prompt the user **to enter three numbers** and store them in **num1**, **num2**, and **num3**.
5. We use the nested if else statement to **find the largest number**.
6. The largest number is determined by **comparing num1 and num2 first and then comparing the result with num3**.
7. We store the largest number in the **largestNumber** variable.
8. We print the largest number using **System.out.println().**
9. The program ends.

Expected Output (Verified):

```
Enter the first number: 5
Enter the second number: 8
Enter the third number: 2
The largest number is: 8
```

Answer to the question no. 4

```
import java.util.Scanner;

public class E5Q4 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter a character: ");
        char ch = scanner.next().charAt(0);

        switch (ch) {
            case 'a':
            case 'e':
            case 'i':
            case 'o':
            case 'u':
                System.out.println(ch + " is a vowel.");
                break;
            default:
                System.out.println(ch + " is a consonant.");
                break;
```

```
    }

    }
}
```

Explanation: In the program, we import the **java.util.Scanner** package to read input from the user. In the class **E5Q4**, inside the main method, we create a **Scanner object** for user input. We prompt the user **to enter a character and store it in variable "ch"**. Using a switch statement, we will check if "ch" variable's value is a vowel or consonant. If it matches any vowel case (a, e, i, o, u), we will print that **it's a vowel.** Otherwise, we will print that **it's a consonant**.

Expected Output (Verified):

```
Enter a character: p
p is a consonant.
```

Answer to the question no. 5

```
import java.util.Scanner;

public class E5Q5 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter a number: ");
        int number = scanner.nextInt();

        if (number % 5 == 0 && number % 7 == 0) {
            System.out.println(number + " is divisible by both 5 and 7.");
        } else {
            System.out.println(number + " is not divisible by both 5 and 7.");
        }
    }
}
```

Explanation: In the program to read input from the user, we have imported the **java.util.Scanner** package. We also define a class called **E5Q5**. In the main method, we create a **Scanner object** to read the user's input. We ask the user to enter a number, which we store in a variable called **number**. To check if the number is divisible by both 5 and 7, we use an if statement. We combine the conditions using the logical operator &&, so we check if the number is divisible by 5 (**number % 5 == 0**) and divisible by 7 (**number % 7 == 0**). If the number meets both conditions, we print a message stating that it is divisible by both 5 and 7. If the number does not meet both conditions, we print a message stating that it is not divisible by both 5 and 7.

Expected Output (Verified):

```
Enter a number: 35
35 is divisible by both 5 and 7.
```

Exercise: 06

Answer to the question no. 1

```
public class E6Q1{
    public static void main(String[] args) {

    // Using a while loop
    int rows1 = 4;
    int i1 = 0;
    while (i1 <= rows1) {
        int j1 = rows1;
        while (j1 > i1) {
            System.out.print("*");
            j1--;
        }
        System.out.println();
        i1++;
    }

    // Using a do-while loop
    int rows2 = 4;
    int i2 = 0;
    do {
        int j2 = rows2;
        do {
            System.out.print("*");
            j2--;
        } while (j2 > i2);
        System.out.println();
        i2++;
    } while (i2 <= rows2);

    // Using a for loop
    int rows3 = 4;
    for (int i3 = 0; i3 <= rows3; i3++) {
        for (int j3 = rows3; j3 > i3; j3--) {
            System.out.print("*");
        }
```

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

Explanation: This program calculates the sum of the first n even numbers. We are using three different loops: **while loop, do-while loop, and for loop.** The variable n represents the number of even numbers to sum. We initialize variables sum as 0 to store the sum and count as 0 to keep track of the number of even numbers encountered. We iterate through numbers starting from 1 and check if each number is even (i.e., divisible by 2). If it is, we add it to the sum and increment the count variable. This process continues until count reaches n, and then we print the sum. **[N.B: I would like to advice you to practice this for more than 10 times a day]**

Expected Output (Verified):

```
Enter a string: Hi There
Lowercase: hi there
```