Uniwersytet Jana Długosza w Częstochowie

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Studia stacjonarne 1 stopnia,

2 rok informatyka, grupa 1

Zadanie 1

```java
private static void task1() {
    double result1 = divide( x: 4.0);
    double result2 = divide( x: 0.0);
    double result3 = divide( x: -3.0);

    System.out.println("1/x for x = 4.0: " + result1);
    System.out.println("1/x for x = 0.0: " + result2);
    System.out.println("1/x for x = -3.0: " + result3);
}
3 usages
private static double divide(double x) {
    if (x > 0) {
        return 1.0 / x;
    } else if (x == 0) {
        return -1;
    } else {
        return -2;
    }
}
```

```
1/x for x = 4.0: 0.25
1/x for x = 0.0: -1.0
1/x for x = -3.0: -2.0
```

Zadanie 2

```java
private static void task2() {
    String hexValue1 = "1aF";
    String hexValue2 = "XYZ";
    String stringValue = "Hello";

    System.out.println(hexValue1 + " is a hex digit: " + hexOK(hexValue1));
    System.out.println(hexValue2 + " is a hex digit: " + hexOK(hexValue2));

    System.out.println(hexValue1 + " is a hex number: " + isHexNumber(hexValue1));
    System.out.println(hexValue2 + " is a hex number: " + isHexNumber(hexValue2));
    System.out.println(stringValue + " is a hex number: " + isHexNumber(stringValue));
}
2 usages
private static boolean hexOK(String value) {
    for (char c : value.toCharArray()) {
        if (!Character.isDigit(c) && (c < 'a' || c > 'f') && (c < 'A' || c > 'F')) {
            return false;
        }
    }
    return true;
}
3 usages
private static boolean isHexNumber(String value) {
    try {
        Long.parseLong(value, radix: 16);
        return true;
    } catch (NumberFormatException e) {
        return false;
    }
}
```

```
1aF is a hex digit: true
XYZ is a hex digit: false
1aF is a hex number: true
XYZ is a hex number: false
Hello is a hex number: false
```

Zadanie 3

```java
private static void task3() {
    int a = 5;
    int b = 10;

    System.out.println("Before swap: a = " + a + ", b = " + b);
    int result = swap(a, b);
    System.out.println("After swap: a = " + a + ", b = " + b);
    System.out.println("Comparison result: " + result);
}
1 usage
private static int swap(int a, int b) {
    int temp = a;
    a = b;
    b = temp;

    if (a == b) {
        return 0;
    } else if (a > b) {
        return 1;
    } else {
        return -1;
    }
}
```

```
Before swap: a = 5, b = 10
After swap: a = 5, b = 10
Comparison result: 1
```

Zadanie 4

```java
private static void task4() {
    Scanner scanner = new Scanner(System.in);

    while (true) {
        System.out.println("Choose an option:");
        System.out.println("1. Calculate area of a square");
        System.out.println("2. Calculate area of a rectangle");
        System.out.println("3. Calculate volume of a cube");
        System.out.println("Other. Exit");
        int choice = scanner.nextInt();

        switch (choice) {
            case 1:
                System.out.println("Enter the side length of the square:");
                int sideLength = scanner.nextInt();
                System.out.println("Area of the square: " + calculateArea(sideLength));
                break;
            case 2:
                System.out.println("Enter the length of the rectangle:");
                double length = scanner.nextDouble();
                System.out.println("Enter the width of the rectangle:");
                double width = scanner.nextDouble();
                System.out.println("Area of the rectangle: " + calculateArea(length, width));
                break;
            case 3:
                System.out.println("Enter the side length of the cube:");
                double cubeSideLength = scanner.nextDouble();
                System.out.println("Volume of the cube: " + calculateVolume(cubeSideLength));
                break;
            default:
                return;
        }
    }
}
1 usage
private static double calculateArea(int sideLength) { return sideLength * sideLength; }
1 usage
private static double calculateArea(double length, double width) { return length * width; }
1 usage
private static double calculateVolume(double sideLength) { return sideLength * sideLength * sideLength; }
```

```
Enter the side length of the square:
123
Area of the square: 15129.0
Choose an option:
1. Calculate area of a square
2. Calculate area of a rectangle
3. Calculate volume of a cube
Other. Exit
2
Enter the length of the rectangle:
123
Enter the width of the rectangle:
2
Area of the rectangle: 246.0
Choose an option:
1. Calculate area of a square
2. Calculate area of a rectangle
3. Calculate volume of a cube
Other. Exit
3
Enter the side length of the cube:
123
Volume of the cube: 1860867.0
Choose an option:
1. Calculate area of a square
2. Calculate area of a rectangle
3. Calculate volume of a cube
Other. Exit
```

Zadanie 5

```java
private static void task5() {
    int[] array = {1, 2, 3, 4, 5, 3, 6, 7, 8, 3, 9};
    int targetValue = 3;
    int[] result = findValueInArray(array, targetValue);

    System.out.println("Number of elements equal to the target value: " + result[0]);
    System.out.println("Index of the first occurrence: " + result[1]);
}
1 usage
private static int[] findValueInArray(int[] arr, int target) {
    int[] result = new int[2];
    result[0] = 0;
    result[1] = -1;

    for (int i = 0; i < arr.length; i++) {
        if (arr[i] == target) {
            if (result[1] == -1) {
                result[1] = i;
            }
            result[0]++;
        }
    }

    return result;
}
```

```
Number of elements equal to the target value: 3
Index of the first occurrence: 2
```

Zadanie 6

```java
private static void task6() {
    int[] myArray = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15};

    System.out.println("Before reversing:");
    displayArray(myArray);

    reverseArray(myArray);

    System.out.println("After reversing:");
    displayArray(myArray);
}
1 usage
private static void reverseArray(int[] arr) {
    int start = 0;
    int end = arr.length - 1;

    while (start < end) {
        int temp = arr[start];
        arr[start] = arr[end];
        arr[end] = temp;

        start++;
        end--;
    }
}
2 usages
private static void displayArray(int[] arr) {
    for (int value : arr) {
        System.out.print(value + " ");
    }
    System.out.println();
}
```

```
Before reversing:
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
After reversing:
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
```

Zadanie 6a

```java
private static void task6a() {
    String binaryValue = "1101";
    int decimalResult = binaryToDecimal(binaryValue);
    System.out.println("Binary to Decimal: " + binaryValue + " = " + decimalResult);

    int decimalValue = 13;
    String binaryResult = decimalToBinary(decimalValue);
    System.out.println("Decimal to Binary: " + decimalValue + " = " + binaryResult);
}
1 usage
private static int binaryToDecimal(String binaryValue) {
    int decimalResult = 0;
    int length = binaryValue.length();

    for (int i = 0; i < length; i++) {
        char digit = binaryValue.charAt(i);
        int power = length - i - 1;
        int value = Character.getNumericValue(digit);
        decimalResult += (int) (value * Math.pow(2, power));
    }

    return decimalResult;
}
2 usages
private static String decimalToBinary(int decimalValue) {
    StringBuilder binaryResult = new StringBuilder();

    while (decimalValue > 0) {
        int remainder = decimalValue % 2;
        binaryResult.insert( offset: 0, remainder);
        decimalValue = decimalValue / 2;
    }

    return binaryResult.toString();
}
```

```
Binary to Decimal: 1101 = 13
Decimal to Binary: 13 = 1101
```

Zadanie 6b

```java
private static void task6b() {
    String hexadecimalValue = "1A";
    int decimalResult = hexToDec(hexadecimalValue);
    System.out.println("Hexadecimal to Decimal: " + hexadecimalValue + " = " + decimalResult);

    int decimalValue = 26;
    String binaryResult = decToBin(decimalValue);
    System.out.println("Decimal to Binary: " + decimalValue + " = " + binaryResult);
}
1 usage
private static int hexToDec(String hexadecimalValue) { return Integer.parseInt(hexadecimalValue, radix: 16); }
1 usage
private static String decToBin(int decimalValue) { return Integer.toBinaryString(decimalValue); }
```

```
Hexadecimal to Decimal: 1A = 26
Decimal to Binary: 26 = 11010
```

Zadanie 7

```java
private static void task7() {
    int number = 1234;
    int iterativeSum = iterativeDigitSum(number);
    int recursiveSum = recursiveDigitSum(number);

    System.out.println("Iterative Digit Sum of " + number + ": " + iterativeSum);
    System.out.println("Recursive Digit Sum of " + number + ": " + recursiveSum);
}
1 usage
private static int iterativeDigitSum(int number) {
    int sum = 0;

    while (number != 0) {
        sum += number % 10;
        number /= 10;
    }

    return sum;
}
2 usages
private static int recursiveDigitSum(int number) {
    if (number == 0) {
        return 0;
    } else {
        return (number % 10) + recursiveDigitSum( number: number / 10);
    }
}
```

```
Iterative Digit Sum of 1234: 10
Recursive Digit Sum of 1234: 10
```

Zadanie 8

```java
private static void task8() {
    Scanner scanner = new Scanner(System.in);

    System.out.print("Enter a non-negative integer N: ");
    int n = scanner.nextInt();

    if (n < 0) {
        System.out.println("Invalid input. Please enter a non-negative integer.");
    } else {
        long iterativeFactorial = iterativeFactorial(n);
        long recursiveFactorial = recursiveFactorial(n);

        System.out.println("Iterative Factorial of " + n + ": " + iterativeFactorial);
        System.out.println("Recursive Factorial of " + n + ": " + recursiveFactorial);
    }
}
1 usage
public static long iterativeFactorial(int n) {
    if (n == 0 || n == 1) {
        return 1;
    }

    long result = 1;
    for (int i = 2; i <= n; i++) {
        result *= i;
    }

    return result;
}
2 usages
public static long recursiveFactorial(int n) {
    if (n == 0 || n == 1) {
        return 1;
    }

    return n * recursiveFactorial( n: n - 1);
}
```

```
Enter a non-negative integer N: 5
Iterative Factorial of 5: 120
Recursive Factorial of 5: 120
```

Zadanie 9

```java
private static void task9() {
    Scanner scanner = new Scanner(System.in);

    System.out.print("Enter a non-negative decimal number: ");
    int decimalNumber = scanner.nextInt();

    if (decimalNumber < 0) {
        System.out.println("Invalid input. Please enter a non-negative integer.");
    } else {
        String binaryRepresentation = decimalToBinary2(decimalNumber);
        System.out.println("Binary representation of " + decimalNumber + ": " + binaryRepresentation);
    }
}
1 usage
private static String decimalToBinary2(int decimalNumber) {
    if (decimalNumber == 0) {
        return "0";
    } else if (decimalNumber == 1) {
        return "1";
    } else {
        return decimalToBinary( decimalValue: decimalNumber / 2) + decimalNumber % 2;
    }
}
```

```
Enter a non-negative decimal number: 12
Binary representation of 12: 1100
```

Zadanie 10

```java
private static void task10() {
    Scanner scanner = new Scanner(System.in);

    System.out.print("Enter a positive integer n: ");
    int n = scanner.nextInt();

    if (n ⩽ 0) {
        System.out.println("Invalid input. Please enter a positive integer.");
    } else {
        int sum = calculateRecursiveSum(n);
        System.out.println("Sum of numbers from 1 to " + n + ": " + sum);
    }
}
2 usages
private static int calculateRecursiveSum(int n) {
    if (n == 1) {
        return 1;
    } else {
        return n + calculateRecursiveSum( n: n - 1);
    }
}
```

```
Enter a positive integer n: 12
Sum of numbers from 1 to 12: 78
```

Zadanie 11

```java
private static void task11() {
    Scanner scanner = new Scanner(System.in);

    System.out.print("Enter a positive integer n: ");
    int n = scanner.nextInt();

    if (n <= 0) {
        System.out.println("Invalid input. Please enter a positive integer.");
    } else {
        reverseNumbers(n);
    }
}
2 usages
private static void reverseNumbers(int n) {
    if (n > 0) {
        System.out.print(n + " ");
        reverseNumbers( n: n - 1);
    }
}
```

```
Enter a positive integer n: 12
12 11 10 9 8 7 6 5 4 3 2 1
```

Zadanie 12

```java
private static void task12() {
    Scanner scanner = new Scanner(System.in);

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

    if (number < 0) {
        System.out.println("Invalid input. Please enter a non-negative integer.");
    } else {
        System.out.println("Reverse of " + number + ": " + reverseDigits(number));
    }
}
2 usages
private static String reverseDigits(int number) {
    if (number < 10) {
        return Integer.toString(number);
    } else {
        int lastDigit = number % 10;
        int remainingDigits = number / 10;
        return Integer.toString(lastDigit) + reverseDigits(remainingDigits);
    }
}
```

```
Enter a non-negative integer: 12
Reverse of 12: 21
```