Uniwersytet Jana Długosza w Częstochowie

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Studia stacjonarne 1 stopnia,

2 rok informatyka, grupa 1

Zadanie A0

```java
private static void taskA0() {
    Scanner scanner = new Scanner(System.in);

    System.out.print("Enter you age: ");
    int age = scanner.nextInt();

    System.out.println("First");

    if (age >= 18) {
        System.out.println("YES");
    }

    System.out.println("Second");

    if (age >= 18) {
        System.out.println("YES");
    } else {
        System.out.println("No");
    }

    scanner.close();
}
```

```
Enter task >>> 1
Enter you age: 17
First
Second
No
```

```
Enter task >>> 1
Enter you age: 18
First
YES
Second
YES
```

Zadanie A0a

```java
private static double taskA0a() {
    Scanner scanner = new Scanner(System.in);

    System.out.print("Enter length: ");
    double length = scanner.nextDouble();

    while (true) {
        System.out.println("1 - km per mile");
        System.out.println("2 - mile per km");
        short mode = scanner.nextShort();

        if (mode == 1) {
            return length * 0.621371;
        } else if (mode == 2) {
            return length * 1.60934;
        }

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

```
Enter length: 123
1 - km per mile
2 - mile per km
1
76.428633
```

```
Enter length: 123
1 - km per mile
2 - mile per km
2
197.94882
```

Zadanie A1

```java
private static void taskA1() {
    Scanner scanner = new Scanner(System.in);

    System.out.print("Enter the weight of your luggage: ");
    double weight = scanner.nextDouble();

    if (weight < 0) {
        System.out.println("Error weight");
        return;
    } else if (weight > 20) {
        final short rate = 10;
        double pay = (weight - 20) * rate;

        System.out.println("Please pay extra for the excess kilogram of " + pay);
    } else if (weight < 20) {
        System.out.println("Remaining to maximum weight of " + (20 - weight));
    } else {
        System.out.println("Information about reaching the maximum weight of luggage");
    }

    scanner.close();
}
```

```
Enter the weight of your luggage: 15
Remaining to maximum weight of 5.0
```

```
Enter the weight of your luggage: 30
Please pay extra for the excess kilogram of 100.0
```

Zadanie A2

```java
private static void taskA2() {
    Scanner scanner = new Scanner(System.in);

    System.out.print("Enter the vehicle weight (in tons): ");
    double vehicleWeight = scanner.nextDouble();

    System.out.print("Enter the vehicle type (p - passenger, c - cargo): ");
    char vehicleType = scanner.next().charAt(0);

    double toll;

    if (vehicleType == 'p') {
        if (vehicleWeight <= 3.5) {
            toll = 10;
        } else {
            toll = 10 + (vehicleWeight - 3.5);
        }
    } else if (vehicleType == 'c') {
        if (vehicleWeight >= 3.5 && vehicleWeight <= 8) {
            toll = 20;
        } else if (vehicleWeight > 8) {
            toll = 20 + 2 * (vehicleWeight - 8);
        } else {
            System.out.println("Error: Cargo vehicle with weight < 3.5T. Toll is 10 PLN.");
            return;
        }
    } else {
        System.out.println("Error: Unknown vehicle type.");
        return;
    }

    System.out.println("The road toll is: " + toll + " PLN");

    scanner.close();
}
```

```
Enter the vehicle weight (in tons): 3
Enter the vehicle type (p - passenger, c - cargo): p
The road toll is: 10.0 PLN
```

```
Enter the vehicle weight (in tons): 4
Enter the vehicle type (p - passenger, c - cargo): c
The road toll is: 20.0 PLN
```

Zadanie A4

```java
private static void taskA4() {
    Scanner scanner = new Scanner(System.in);

    System.out.print("How many years of experience: ");
    double experience = scanner.nextDouble();

    System.out.print("How many hours did you work: ");
    double hoursWord = scanner.nextDouble();

    double basicRatePerHour = 30;
    double basicHours = 5 * 8;
    final double OM = 2; // MN
    final double RM = 1.2; // MS
    double salary = basicRatePerHour * basicHours;

    if (experience >= 5) {
        salary *= RM;
    }

    if (hoursWord > basicRatePerHour) {
        salary += (hoursWord - basicRatePerHour) * OM;
    }

    System.out.println("Salary: " + salary);
}
```

```
How many years of experience: 5
How many hours did you work: 30
Salary: 1440.0
```

```
How many years of experience: 5
How many hours did you work: 40
Salary: 1460.0
```

```
How many years of experience: 4
How many hours did you work: 30
Salary: 1200.0
```

```
How many years of experience: 4
How many hours did you work: 40
Salary: 1220.0
```

Zadanie A5

```java
double pngSize = taskA5( fileType: "PNG", width: 800, height: 600, colorDepth: 24, compressionRatio: 1.0);
double bmpSize = taskA5( fileType: "BMP", width: 1024, height: 768, colorDepth: 32, compressionRatio: 1.0);
double customSize = taskA5( fileType: "Custom", width: 500, height: 300, colorDepth: 16, compressionRatio: 1.5);

System.out.printf("PNG Size: %.2f kB\n", pngSize);
System.out.printf("BMP Size: %.2f kB\n", bmpSize);
System.out.printf("Custom Size: %.2f kB\n", customSize);
```

```java
private static double taskA5(String fileType,
                             int width,
                             int height,
                             int colorDepth,
                             double compressionRatio) {
    int headerSize = 0;

    if ("PNG".equals(fileType)) {
        headerSize = 32;
    } else if ("BMP".equals(fileType)) {
        headerSize = 24;
    }

    double dataSize = width * height * (colorDepth / 8.0);
    double totalSize;

    if (headerSize > 0) {
        double compressedSize = dataSize / compressionRatio;
        totalSize = headerSize + compressedSize;
    } else {
        totalSize = dataSize;
    }

    double sizeInKB = totalSize / 1024.0;

    return sizeInKB;
}
```

```
PNG Size: 1406.28 kB
BMP Size: 3072.02 kB
Custom Size: 292.97 kB
```

Zadanie B1

```java
private static void taskB1() {
    Scanner scanner = new Scanner(System.in);

    System.out.print("Enter i (begin): ");
    int begin = scanner.nextInt();

    System.out.print("Enter n (end): ");
    int end = scanner.nextInt();

    double reuslt = 1;

    for (int i = begin; i <= end; i++) {
        reuslt *= i;
    }

    System.out.println("Suma: " + reuslt);
}
```

```
Enter i (begin): 1
Enter n (end): 2
Suma: 2.0
```

Zadanie B2

```java
private static void taskB2() {
    int i = 1;
    int basis = 2;
    int exponent = 3;
    long result = 1;

    do {
        result = result * basis;
        i++;
    } while (i ≤ exponent);

    System.out.println("result = " + result + " i = " + i);

    i = 1;
    result = 1;
    while (i ≤ exponent)
    {
        result = result * basis;
        i++;
    }

    System.out.println("result = " + result + " i = " + i);

    result = 1;
    for (i = 1; i ≤ exponent; i++) {
        result = result * basis;
    }

    System.out.println("result = " + result + " i = " + i);
}
```

```
result = 8 i = 4
result = 8 i = 4
result = 8 i = 4
```

Zadanie B3

```java
private static void taskB3() {
    Scanner scanner = new Scanner(System.in);

    int countEvents = 0;
    int countTens = 0;
    int countNumbers = 0;
    double suma = 0;
    int number;

    do {
        System.out.print("Enter number: ");
        number = scanner.nextInt();

        if (number == 0) {
            break;
        }

        if (number % 10 == 0 ) {
            countTens++;
        } else if (number % 2 == 0) {
            countEvents++;
        }

        suma += number;
        countNumbers++;
    } while (number != 0);

    double average = suma / countNumbers;

    System.out.println("countEvents: " + countEvents);
    System.out.println("countTens: " + countTens);
    System.out.println("countNumbers: " + countNumbers);
    System.out.println("suma: " + suma);
    System.out.println("Average: " + average);
}
```

```
Enter number: 1
Enter number: 3
Enter number: 4
Enter number: 5
Enter number: 6
Enter number: 7
Enter number: 8
Enter number: 9
Enter number: 10
Enter number: 20
Enter number: 0
countEvents: 3
countTens: 2
countNumbers: 10
suma: 73.0
Average: 7.3
```

Zadanie B4

```java
private static int performDraws(int x, int y, int numberOfDraws, boolean withRepetition, int numberToCheck) {
    Random random = new Random();
    Set<Integer> drawnNumbers = new HashSet<>();
    int repeatedOccurrences = 0;

    for (int i = 0; i < numberOfDraws; i++) {
        int drawnNumber;

        if (withRepetition) {
            drawnNumber = random.nextInt( bound: y - x + 1) + x;
            if (drawnNumber == numberToCheck) {
                repeatedOccurrences++;
            }
        } else {
            do {
                drawnNumber = random.nextInt( bound: y - x + 1) + x;
            } while (drawnNumbers.contains(drawnNumber));
            drawnNumbers.add(drawnNumber);
        }

        System.out.print(drawnNumber + " ");
    }

    return repeatedOccurrences;
}
```

```java
private static void taskB4() {
    Scanner scanner = new Scanner(System.in);

    System.out.print("Enter the range (x): ");
    int x = scanner.nextInt();

    System.out.print("Enter the range (y): ");
    int y = scanner.nextInt();

    System.out.print("Enter the number of draws: ");
    int numberOfDraws = scanner.nextInt();

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

    System.out.println("Repeated Draws:");
    int repeatedOccurrences = performDraws(x, y, numberOfDraws, withRepetition: true, numberToCheck);
    System.out.println("Number " + numberToCheck + " repeated " + repeatedOccurrences + " times.");

    System.out.println("\nDraws without Repetition:");
    performDraws(x, y, numberOfDraws, withRepetition: false, numberToCheck: 0);

    System.out.print("\nEnter the number of repeated draw statistics: ");
    int numberOfStats = scanner.nextInt();
    generalStatistics(x, y, numberOfDraws, numberOfStats);
}
```

```java
private static void generalStatistics(int x, int y, int numberOfDraws, int numberOfStats) {
    System.out.println("\nGeneral Statistics for Repeated Draws:");
    Map<Integer, Integer> occurrencesMap = new HashMap<>();

    for (int i = 0; i < numberOfStats; i++) {
        int repeatedOccurrences = performDraws(x, y, numberOfDraws, withRepetition: true, numberToCheck: 0);
        occurrencesMap.put(i + 1, repeatedOccurrences);
    }

    for (Map.Entry<Integer, Integer> entry : occurrencesMap.entrySet()) {
        System.out.println("Number " + entry.getKey() + " repeated " + entry.getValue() + " times.");
    }
}
```

Zadanie B5

```java
private static void taskB5() {
    final short count = 10;
    for (int row = 1; row <= count; row++) {
        for (int column = 1; column <= count; column++) {
            System.out.printf("%4d", (row * column));
        }

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

```
 1   2   3   4   5   6   7   8   9  10
 2   4   6   8  10  12  14  16  18  20
 3   6   9  12  15  18  21  24  27  30
 4   8  12  16  20  24  28  32  36  40
 5  10  15  20  25  30  35  40  45  50
 6  12  18  24  30  36  42  48  54  60
 7  14  21  28  35  42  49  56  63  70
 8  16  24  32  40  48  56  64  72  80
 9  18  27  36  45  54  63  72  81  90
10  20  30  40  50  60  70  80  90 100
```

Zadanie B6

```java
private static void taskB6() {
    Scanner scanner = new Scanner(System.in);

    System.out.println("Enter binary digits (0 or 1) separated by spaces. Press Enter to finish:");

    String input = scanner.nextLine();
    String[] inputArray = input.split( regex: "\\s+");

    int onesCount = 0;
    int errorsCount = 0;

    for (String digit : inputArray) {
        if (digit.matches( regex: "[01]")) {
            int binaryDigit = Integer.parseInt(digit);
            onesCount += binaryDigit;
        } else {
            errorsCount++;
        }
    }

    if (errorsCount > 0) {
        System.out.println("Warning: " + errorsCount + " invalid input(s) detected and ignored.");
    }

    int result = onesCount % 2;

    System.out.println("\nSummary:");
    System.out.println("Ones Count: " + onesCount);
    System.out.println("Errors Count: " + errorsCount);
    System.out.println("XOR Result: " + result);
}
```

```
Enter binary digits (0 or 1) separated by spaces. Press Enter to finish:
1111 1 1 1 111 1
Warning: 2 invalid input(s) detected and ignored.

Summary:
Ones Count: 4
Errors Count: 2
XOR Result: 0
```

Zadanie B7

```java
private static void taskB7() {
    Scanner scanner = new Scanner(System.in);

    System.out.println("Enter binary digits (0 or 1) without pressing Enter. Press Enter to finish:");

    StringBuilder inputBuilder = new StringBuilder();
    int onesCount = 0;
    int errorsCount = 0;

    while (true) {
        String input = scanner.nextLine();

        if (input.isEmpty()) {
            break;
        }

        char lastChar = input.charAt(input.length() - 1);

        if (lastChar == '0' || lastChar == '1') {
            inputBuilder.append(lastChar);
            int binaryDigit = Character.getNumericValue(lastChar);
            onesCount += binaryDigit;
        } else {
            errorsCount++;
        }
    }

    if (errorsCount > 0) {
        System.out.println("Warning: " + errorsCount + " invalid input(s) detected and ignored.");
    }

    int result = onesCount % 2;

    System.out.println("\nSummary:");
    System.out.println("Ones Count: " + onesCount);
    System.out.println("Errors Count: " + errorsCount);
    System.out.println("XOR Result: " + result);
}
```

```
Enter binary digits (0 or 1) without pressing Enter. Press Enter to finish:
1111 1 1 1 111 1


Summary:
Ones Count: 1
Errors Count: 0
XOR Result: 1
```

Zadanie B8

```java
private static void taskB8() {
    Scanner scanner = new Scanner(System.in);
    Random random = new Random();
    int randomNumber, number, count = 0;

    randomNumber = random.nextInt( origin: 1,  bound: 100 + 1);
    System.out.println(randomNumber);

    do {
        System.out.print("Enter number: ");
        number = scanner.nextInt();

        if (number < randomNumber) {
            System.out.println("Too small a number");
        }
        else if (number > randomNumber) {
            System.out.println("Too much a number");
        }
        else {
            System.out.println("Yes, this is the number");
        }

        count++;
    } while (number != randomNumber);

    System.out.println("Counter: " + count);
}
```

```
27
Enter number: 23
Too small a number
Enter number: 30
Too much a number
Enter number: 27
Yes, this is the number
Counter: 3
```

Zadanie B9

```java
private static void taskB9() {
    Scanner scanner = new Scanner(System.in);

    int number, suma = 0, count = 0, max = Integer.MIN_VALUE, min = Integer.MAX_VALUE;
    double average = 0;

    do {
        System.out.print("Enter number: ");
        number = scanner.nextInt();

        if (number == 0) {
            break;
        }

        count++;
        suma += number;
        max = max(number, max);
        min = min(number, min);
    } while(true);

    average = (double) suma / count;

    System.out.println("Count: " + count);
    System.out.println("Suma: " + suma);
    System.out.println("Average: " + average);
    System.out.println("Min: " + min);
    System.out.println("Max: " + max);
}
```

```java
private static int min(int number, int min) {
    if (number < min) {
        return number;
    }

    return min;
}
```

```java
private static int max(int number, int max) {
    if (number > max) {
        return number;
    }

    return max;
}
```

```
Enter number: 1
Enter number: 2
Enter number: 3
Enter number: 4
Enter number: 5
Enter number: 6
Enter number: 7
Enter number: 8
Enter number: 9
Enter number: 10
Enter number: 12
Enter number: 11
Enter number: 0
Count: 12
Suma: 78
Average: 6.5
Min: 1
Max: 12
```

Zadanie B10

```java
private static void taskB10() {
    Scanner scanner = new Scanner(System.in);

    System.out.print("Enter a number to check for primality: ");
    long numberToCheck = scanner.nextLong();

    long startTime = System.currentTimeMillis();
    boolean isPrime = isPrimeNumber(numberToCheck);
    long endTime = System.currentTimeMillis();
    long elapsedTime = endTime - startTime;

    System.out.println("\nSummary:");
    System.out.println(numberToCheck + " is " + (isPrime ? "prime" : "not prime"));
    System.out.println("Time elapsed: " + elapsedTime + " milliseconds");
}
// 1 usage
private static boolean isPrimeNumber(long number) {
    if (number <= 1) {
        return false;
    }

    for (long i = 2; i <= Math.sqrt(number); i++) {
        if (number % i == 0) {
            return false;
        }
    }

    return true;
}
```

```
Enter a number to check for primality: 2

Summary:
2 is prime
Time elapsed: 0 milliseconds
```

Zadanie B11

```java
private static void taskB11() {
    Scanner scanner = new Scanner(System.in);

    int totalMatches = 11;
    int matchesToRemove;
    int currentPlayer = 1;
    int player1Matches = 0;
    int player2Matches = 0;

    long startTime = System.currentTimeMillis();

    while (totalMatches > 0) {
        System.out.println("Player " + currentPlayer + ", there are " + totalMatches + " matches left.");
        System.out.print("How many matches do you want to remove (1-3)? ");

        matchesToRemove = scanner.nextInt();

        if (matchesToRemove < 1 || matchesToRemove > 3 || matchesToRemove > totalMatches) {
            System.out.println("Invalid move. Please choose 1, 2, or 3 matches.");
            continue;
        }

        if (currentPlayer == 1) {
            player1Matches += matchesToRemove;
        } else {
            player2Matches += matchesToRemove;
        }

        totalMatches -= matchesToRemove;
        currentPlayer = 3 - currentPlayer;

        System.out.println();
    }

    long endTime = System.currentTimeMillis();
    long elapsedTime = endTime - startTime;

    System.out.println("Game Over!");
    System.out.println("Player 1 matches: " + player1Matches);
    System.out.println("Player 2 matches: " + player2Matches);
    System.out.println("Total time: " + elapsedTime / 1000 + " seconds");
}
```

```
Player 1, there are 11 matches left.
How many matches do you want to remove (1-3)? 1

Player 2, there are 10 matches left.
How many matches do you want to remove (1-3)? 1

Player 1, there are 9 matches left.
How many matches do you want to remove (1-3)? 2

Player 2, there are 7 matches left.
How many matches do you want to remove (1-3)? 3

Player 1, there are 4 matches left.
How many matches do you want to remove (1-3)? 2

Player 2, there are 2 matches left.
How many matches do you want to remove (1-3)? 1

Player 1, there are 1 matches left.
How many matches do you want to remove (1-3)? 2
Invalid move. Please choose 1, 2, or 3 matches.
Player 1, there are 1 matches left.
How many matches do you want to remove (1-3)? 3
Invalid move. Please choose 1, 2, or 3 matches.
Player 1, there are 1 matches left.
How many matches do you want to remove (1-3)? 3
Invalid move. Please choose 1, 2, or 3 matches.
Player 1, there are 1 matches left.
How many matches do you want to remove (1-3)? 1

Game Over!
Player 1 matches: 6
Player 2 matches: 5
Total time: 25 seconds
```

Zadanie B12

```java
private static void taskB12() {
    Scanner scanner = new Scanner(System.in);

    System.out.print("Enter the first integer: ");
    int number1 = scanner.nextInt();

    System.out.print("Enter the second integer: ");
    int number2 = scanner.nextInt();

    while (number2 != 0) {
        int temp = number2;
        number2 = number1 % number2;
        number1 = temp;
    }

    int gcd = Math.abs(number1);

    System.out.println("GCD of " + number1 + " and " + number2 + " is: " + gcd);
}
```

```
Enter the first integer: 12
Enter the second integer: 985
GCD of 1 and 0 is: 1
```

Zadanie B13

```java
private static void taskB13() {
    Scanner scanner = new Scanner(System.in);

    System.out.print("Enter the value of n: ");
    int n = scanner.nextInt();

    System.out.print("Enter the value of m: ");
    int m = scanner.nextInt();

    for (int i = 0; i < n; i++) {
        int fib = m <= 1 ? m : fibonacci(m);
        System.out.print(fib + " ");
        m++;
    }
}
3 usages
private static int fibonacci(int n) {
    return n <= 1 ? n : fibonacci( n: n - 1) + fibonacci( n: n - 2);
}
```

```
Enter the value of n: 1
Enter the value of m: 9
34
```

Zadanie B14

```java
private static void taskB14() {
    int n = 1000;
    int[] results = new int[6];
    Random random = new Random();

    long startTime = System.currentTimeMillis();

    for (int i = 0; i < n; i++) {
        int rollResult = random.nextInt( bound: 6) + 1;
        results[rollResult - 1]++;
    }

    long endTime = System.currentTimeMillis();
    long elapsedTime = endTime - startTime;

    System.out.println("Dice Roll Statistics (100% = " + n + " rolls):");
    for (int i = 0; i < 6; i++) {
        int percentage = results[i] * 100 / n;
        String bar = repeatCharacter( character: '*', percentage);
        System.out.printf("%d: %3d%% | %s\n", i + 1, percentage, bar);
    }

    System.out.println("\nTime elapsed: " + elapsedTime + " milliseconds");
}
1 usage
private static String repeatCharacter(char character, int times) {
    StringBuilder result = new StringBuilder();
    for (int i = 0; i < times; i++) {
        result.append(character);
    }
    return result.toString();
}
```

```
Dice Roll Statistics (100% = 1000 rolls):
 1:   19% | *******************
 2:   17% | *****************
 3:   16% | ****************
 4:   15% | ***************
 5:   15% | ***************
 6:   15% | ***************

Time elapsed: 0 milliseconds
```

Zadanie B15

```java
private static void taskB15() {
    Scanner scanner = new Scanner(System.in);
    char choice;

    infiniteLoop:
    for (int number = 0; ; number++) {
        System.out.println("Current number: " + number);
        System.out.print("Do you want to continue? (Press 'k' to exit): ");
        choice = scanner.next().toLowerCase().charAt(0);

        if (number % 27 == 0) {
            System.out.println("Divisible by 27");
        }

        if (number % 127 == 0) {
            System.out.println("Divisible by 127. Exiting the loop.");
            break infiniteLoop;
        }

        if (number % 59 == 0) {
            System.out.println("Divisible by 59. Going to the beginning of the loop.");
            continue infiniteLoop;
        }

        if (choice == 'k') {
            System.out.println("Exiting the loop by user request.");
            break;
        }
    }
}
```

```
Current number: 0
Do you want to continue? (Press 'k' to exit): k
Divisible by 27
Divisible by 127. Exiting the loop.
```

Zadanie C1

```java
private static void taskC1() {
    Scanner scanner = new Scanner(System.in);

    System.out.println("Choose a shape to calculate the area:");
    System.out.println("1. Square");
    System.out.println("2. Rectangle");
    System.out.println("3. Circle");

    int choice = scanner.nextInt();

    switch (choice) {
        case 1:
            calculateSquareArea();
            break;
        case 2:
            calculateRectangleArea();
            break;
        case 3:
            calculateCircleArea();
            break;
        default:
            System.out.println("Invalid choice. Please choose a valid option.");
    }
}
```

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

    System.out.print("Enter the side length of the square: ");
    double sideLength = scanner.nextDouble();

    double area = sideLength * sideLength;

    System.out.println("The area of the square is: " + area);
}
```

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

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

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

    double area = length * width;

    System.out.println("The area of the rectangle is: " + area);
}
```

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

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

    double area = Math.PI * radius * radius;

    System.out.println("The area of the circle is: " + area);
}
```

```
Choose a shape to calculate the area:
1. Square
2. Rectangle
3. Circle
1
Enter the side length of the square: 123
The area of the square is: 15129.0
```

```
Choose a shape to calculate the area:
1. Square
2. Rectangle
3. Circle
2
Enter the length of the rectangle: 123
Enter the width of the rectangle: 50
The area of the rectangle is: 6150.0
```

```
Choose a shape to calculate the area:
1. Square
2. Rectangle
3. Circle
3
Enter the radius of the circle: 123
The area of the circle is: 47529.15525615998
```

Zadanie C2

```java
private static void taskC2() {
    Scanner scanner = new Scanner(System.in);

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

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

    System.out.println("Choose an operation:");
    System.out.println("1. Addition");
    System.out.println("2. Subtraction");
    System.out.println("3. Multiplication");
    System.out.println("4. Division");
    System.out.println("5. Exponentiation");

    int choice = scanner.nextInt();

    switch (choice) {
        case 1:
            performAddition(num1, num2);
            break;
        case 2:
            performSubtraction(num1, num2);
            break;
        case 3:
            performMultiplication(num1, num2);
            break;
        case 4:
            performDivision(num1, num2);
            break;
        case 5:
            performExponentiation(num1, num2);
            break;
        default:
            System.out.println("Invalid choice. Please choose a valid option.");
    }
}
```

```java
private static void performAddition(double num1, double num2) {
    double result = num1 + num2;
    System.out.println("Result of addition: " + result);
}
1 usage
private static void performSubtraction(double num1, double num2) {
    double result = num1 - num2;
    System.out.println("Result of subtraction: " + result);
}
1 usage
private static void performMultiplication(double num1, double num2) {
    double result = num1 * num2;
    System.out.println("Result of multiplication: " + result);
}
1 usage
private static void performDivision(double num1, double num2) {
    if (num2 != 0) {
        double result = num1 / num2;
        System.out.println("Result of division: " + result);
    } else {
        System.out.println("Cannot divide by zero.");
    }
}
1 usage
private static void performExponentiation(double base, double exponent) {
    double result = Math.pow(base, exponent);
    System.out.println("Result of exponentiation: " + result);
}
```

```
Enter the first number: 5
Enter the second number: 5
Choose an operation:
1. Addition
2. Subtraction
3. Multiplication
4. Division
5. Exponentiation
1
Result of addition: 10.0
```

```
Enter the first number: 5
Enter the second number: 5
Choose an operation:
1. Addition
2. Subtraction
3. Multiplication
4. Division
5. Exponentiation
2
Result of subtraction: 0.0
```

```
Enter the first number: 5
Enter the second number: 5
Choose an operation:
1. Addition
2. Subtraction
3. Multiplication
4. Division
5. Exponentiation
3
Result of multiplication: 25.0
```

```
Enter the first number: 5
Enter the second number: 5
Choose an operation:
1. Addition
2. Subtraction
3. Multiplication
4. Division
5. Exponentiation
4
Result of division: 1.0
```

```
Enter the first number: 5
Enter the second number: 5
Choose an operation:
1. Addition
2. Subtraction
3. Multiplication
4. Division
5. Exponentiation
5
Result of exponentiation: 3125.0
```