

1. Implement console program which will meet the following requirements:
 - a. Program starts and asks the user to input integer numbers separated by space.
 - b. Program creates an array object with entered numbers.
 - c. Program calls a specific method which takes `int[]` as a parameter and returns max value in this array.

Method should look like this:

```
public static int findMaxIntInArray(int[] intArray) {  
    <write your code here>  
}
```

- d. Program prints the max value from the array to the console.

2. Implement console program which will meet the following requirements:
 - a. Program starts and asks user to input height of the rectangle
 - b. After the user inputs heights of the rectangle, the program asks to input the width of the rectangle.
 - c. Program calls specific method which takes two parameters of int type which prints rectangle to the console:

```
++++++  
+      +  
++++++
```

Method should look like this:

```
public static void drawRectangle(int height, int width) {  
    <write your code here>  
}
```

- d. In the example above height of the rectangle is 3, the width of the rectangle is 6

N.B.: rectangle is empty inside

3. Implement console program which will meet the following requirements:
 - a. Program starts and asks the user to enter text.
 - b. Program calls a specific function which takes one parameter of String type and returns the amount of words in the text.

Method should look like this:

```
public static int getWordsAmount(String text) {  
    <write your code here>  
}
```

c. Program prints the amount of words to the console.

4. Implement console program which will meet the following requirements:

- a. Program starts and asks user to enter random words separated by space
- b. Program asks user to enter minimum length of string to filter words which were entered
- c. Program creates array object from entered words
- d. Program calls specific method which takes `String[]` as a parameter and returns array of strings which contains words that have length more or equal to value specified by user

Method should look like this:

```
public static String[] filterWordsByLength(int minLength, String[] words)  
{  
    <write your code here>  
}
```

e. Program prints filtered array to the console output.

5. Implement console program which will meet the following requirements:

- a. Program starts and asks user to specify matrix size. For example if user entered '5' program will generate next matrix:

```
0.0  0.1  0.2  0.3  0.4  
1.0  1.1  1.2  1.3  1.4  
2.0  2.1  2.2  2.3  2.4  
3.0  3.1  3.2  3.3  3.4  
4.0  4.1  4.2  4.3  4.4
```

- b. Program asks user this question with options:

How much do you want to rotate the matrix?

- Press 1 to rotate matrix to 90 degrees
- Press 2 to rotate matrix to 180 degrees
- Press 3 to rotate matrix to 270 degrees

- c. When the user chooses rotation mode programs prints the initial matrix and rotated one.

- d. Rotation for 90 degrees looks like this:

```
4.0  3.0  2.0  1.0  0.0  
4.1  3.1  2.1  1.1  0.1  
4.2  3.2  2.2  1.2  0.2  
4.3  3.3  2.3  1.3  0.3  
4.4  3.4  2.4  1.4  0.4
```

e. Rotation for 180 degrees looks like this:

| | | | | |
|-----|-----|-----|-----|-----|
| 4.4 | 4.3 | 4.2 | 4.1 | 4.0 |
| 3.4 | 3.3 | 3.2 | 3.1 | 3.0 |
| 2.4 | 2.3 | 2.2 | 2.1 | 2.0 |
| 1.4 | 1.3 | 1.2 | 1.1 | 1.0 |
| 0.4 | 0.3 | 0.2 | 0.1 | 0.0 |

f. Rotation for 270 degrees looks like this:

| | | | | |
|-----|-----|-----|-----|-----|
| 0.4 | 1.4 | 2.4 | 3.4 | 4.4 |
| 0.3 | 1.3 | 2.3 | 3.3 | 4.3 |
| 0.2 | 1.2 | 2.2 | 3.2 | 4.2 |
| 0.1 | 1.1 | 2.1 | 3.1 | 4.1 |
| 0.0 | 1.0 | 2.0 | 3.0 | 4.0 |

g. You have to implement next methods:

```
public static void rotate90(double[][] matrix) {  
    <write your code here>  
}
```

```
public static void rotate180(double[][] matrix) {  
    <write your code here>  
}
```

```
public static void rotate270(double[][] matrix) {  
    <write your code here>  
}
```

6. Implement console program which will meet the following requirements:

- Program starts and asks the user to enter the length of an array.
- Program generates an array of random integer numbers (use `java.util.Random`) with array length specified by the user.

Method should look like this:

```
public static int[] generateRandomArray(int amountOfElements) {  
    <write your code here>  
}
```

- Program creates the second array with size of twice as much as the first array.
- The first elements in the new array are first the same elements as in the old array. The other half of elements are elements as in the first array multiplied by two.

Method should look like this:

```
public static int[] extendArray(int[] arr) {  
    <write your code here>  
}
```

For example, if user set initial array length as ten:

array #1 - {1, 3, 5, 7, 10, 11, 12, 15, 17, 20} (generated randomly)

array #2 - {1, 3, 5, 7, 10, 11, 12, 15, 17, 20, 2, 6, 10, 14, 20, 22, 24, 30, 34, 40}

7. Implement console program which will meet the following requirements:
 - a. Program starts and asks user to enter two numbers separated by space
 - b. Program calls a specific method to find the greatest common divisor.

Method should look like this:

```
public static int gcdRecursive(int firstNumber, int secondNumber) {  
    <write your code here>  
}
```

- c. Program prints greatest common divisor to console
8. Implement console program which will meet the following requirements:
 - a. Program starts and asks user to enter number
 - b. Program calls method which takes int as an argument and returns sum of all digits in this number.

Method should look like this:

```
public static int sumDigitsInPositiveNumber(int number) {  
    <write your code here>  
}
```

- c. Program prints sum of all digits to console
9. Implement console program which will meet the following requirements:
 - a. Program contains methods that can process input string according to requirements below
 - b. You have input string like this:

Login;Name;Email

peterson;Chris Peterson;peterson@outlook.com

james;Derek James;james@gmail.com

jackson;Walter Jackson;jackson@gmail.com

gregory;Mike Gregory;gregory@yahoo.com

- c. Your program has next method:

```
public static String convert1(String input) {
```

<write your code here>

}

Which formats input data like this:

peterson ==> peterson@outlook.com

james ==> james@gmail.com

jackson ==> jackson@gmail.com

gregory ==> gregory@yahoo.com

- d. Your program has next method:

public static String convert2(String input) {

<write your code here>

}

Which formats input data like this:

Chris Peterson (email: peterson@outlook.com)

Derek James (email: james@gmail.com)

Walter Jackson (email: jackson@gmail.com)

Mike Gregory (email: gregory@yahoo.com)

10. Implement console program which will meet the following requirements:

- a. Program starts and asks user to enter text
- b. Program format text with the next rules:
 - i. all characters in word should become lower case
 - ii. the first letter in the word should become upper case
- c. Program prints result of formatting to console
- d. To format text program uses next method:

public static String firstCharToTitleCase(String string) {

<write your code here>

}

11. Implement console program which will meet the following requirements:

- a. Program starts and asks user to select more:
 - i. to convert from decimal to Roman number user should enter D2R
 - ii. to convert from Roman number to decimal user should enter R2D
- b. In case user entered random text, program asks user again to enter either D2R or R2D
- c. In case user entered R2D, program asks user to enter Roman number
- d. In case this is invalid Roman number, the program asks the user to enter Roman number again.
- e. In case this is a valid roman number, the program converts it to decimal and prints to console.

- f. In case a user entered D2R, the program asks user to enter integer.
- g. In case this is negative integer or more than 100 or zero, program asks to enter integer again.
- h. In case this is valid integer, program converts it to Roman number and prints to console.
- i. Program works properly with range of numbers from 1 to 100 inclusively and the same range for Roman number
- j. You are not allowed to use 'brute force' and create switch statement with all Roman numbers mapped to integer. Try to come up with algorithm. To understand the algorithm, you can use this wiki page https://en.wikipedia.org/wiki/Roman_numerals.

You have to implement next methods:

```
public static String decimal2Roman(int number) {  
    <write your code here>  
}
```

```
public static int roman2Decimal(String romanNumber) {  
    <write your code here>  
}
```

```
public static boolean isRomanNumberValid(String romanNumber) {  
    <write your code here>  
}
```

```
public static boolean isDecimalNumberValid(int decimalNumber) {  
    <write your code here>  
}
```