# Homework: Java Syntax

This document defines homework assignments from the [“Java Basics“ Course @ Software University](https://softuni.bg/courses/java-basics/). Please submit as homework a single zip / rar / 7z archive holding the solutions (source code) of all below described problems.

## Rectangle Area

Write a program that enters the **sides of a rectangle** (two integers **a** and **b**) and calculates and prints the rectangle's area. Examples:

|  |  |
| --- | --- |
| **Input** | **Output** |
| 7 20 | 140 |
| 5 12 | 60 |

## Triangle Area

Write a program that enters 3 points in the plane (as integer **x** and **y** coordinates), calculates and prints the **area of the triangle** composed by these 3 points. Round the result to a whole number. In case the three points do not form a triangle, print "**0**" as result. Examples:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Input** | **Output** |  | **Input** | **Output** |  | **Input** | **Output** |
| -5 10  25 30  60 15 | 575 | 53 18  56 23  24 27 | 86 | 1 1  2 2  3 3 | 0 |

This resource could help you: <http://www.mathopenref.com/coordtrianglearea.html>.

## Formatting Numbers

Write a program that reads 3 numbers: an integer a (0 ≤ a ≤ 500), a floating-point b and a floating-point c and **prints them in 4 virtual columns** on the console. Each column should have a width of 10 characters. The number a should be printed in **hexadecimal, left aligned**; then the number a should be printed in binary form, padded with zeroes, then the number b should be **printed with 2 digits after the decimal point, right aligned**; the number c should be **printed with 3 digits after the decimal point, left aligned**. Examples:

|  |  |  |  |
| --- | --- | --- | --- |
| **a** | **b** | **c** | **result** |
| 254 | 11.6 | 0.5 | |FE |0011111110| 11.60|0.500 | |
| 499 | -0.5559 | 10000 | |1F3 |0111110011| -0.56|10000.000 | |
| 0 | 3 | -0.1234 | |0 |0000000000| 3.00|-0.123 | |
| 444 | -7.5 | 7.5 | |1BC |0110111100| -7.50|7.500 | |

## Calculate expression

Write a program that reads three floating point numbers from the console and calculates their result with the following formulae:

**((a2 + b2)/ (a2 – b2))(a + b + c) / √c  (a2 + b2 - c3)(a – b)**

Then calculate the difference between the average of the three numbers and the average of the two formulae. **Average (a, b, c) – Average (f1, f2)**

|  |  |  |  |
| --- | --- | --- | --- |
| **a** | **b** | **c** | **result** |
| 5 | 2 | 3 | F1 result: 6.45; F2 result: 8.00; Diff: 3.89 |
| 3.8 | 2.5 | 1.2 | F1 result: 569.60; F2 result: 45.84; Diff: 305.22 |
| 1.25 | 1.22 | 1.24 | F1 result: 239530.27; F2 result: 1.00; Diff: 119764.40 |
| 3.21 | 1 | 2.1 | F1 result: 2.33; F2 result: 4.85; Diff: 1.49 |
| 0 | 0 | 0 | F1 result: NaN; F2 result: 1.00; Diff: NaN |

## Convert from decimal system to base-7

Write a program that takes an integer number and converts it to base-7

|  |  |
| --- | --- |
| **Decimal** | **Base-7** |
| 10 | 13 |
| 7 | 10 |
| 123 | 234 |
| 1000 | 2626 |
| 1 | 1 |

## Convert from base-7 to decimal

Write a program that converts from a base-7 number to its decimal representation

|  |  |
| --- | --- |
| **Base-7** | **Decimal** |
| 13 | 10 |
| 10 | 7 |
| 234 | 123 |
| 2626 | 1000 |
| 1 | 1 |

## Randomize numbers from N to M

Write a program that takes as input two integers N and M, and randomizes the numbers between them. Note that M may be smaller than or equal to N.

|  |  |  |
| --- | --- | --- |
| **N** | **M** | **Randomized (your output may be different : ))** |
| 13 | 10 | 10 12 13 11 |
| 10 | 20 | 12 13 20 10 11 18 15 17 14 19 16 |
| 5 | 5 | 5 |

## \*Odd and Even Pairs

You are given an array of integers as a single line, separated by a space. Write a program that checks consecutive pairs and prints if both are odd/even or not. Note that the array length should also be an even number

|  |  |
| --- | --- |
| **Input** | **Output** |
| 1 2 3 4 | 1, 2 -> different  3, 4 -> different |
| 2 8 11 15 3 2 | 2, 8 -> both are even  11, 15 -> both are odd  3, 2 -> different |
| 1 8 11 1 2 | Invalid length |

## \*Hit the Target

Write a program that takes as input an integer – the target – and outputs to the console all pairs of numbers between 1 and 20, which, if added or subtracted, result in the target.

|  |  |
| --- | --- |
| **Target** | **Output** |
| 5 | 1 + 4 = 5  2 + 3 = 5  3 + 2 = 5  …  19 - 14 = 5  20 - 15 = 5 |
| 35 | 15 + 20 = 35  16 + 19 = 35  17 + 18 = 35  18 + 17 = 35  19 + 16 = 35  20 + 15 = 35 |
| 0 | 1 - 1 = 0  2 - 2 = 0  …  19 - 19 = 0  20 - 20 = 0 |

## Extract words

Write a program that extracts words from a string. Words are sequences of characters that are at least two symbols long and consist **only** of English alphabet letters. **Use regex.**

|  |  |
| --- | --- |
| **Words** | **Output** |
| Az&76sym&&samo&cvqt&lilav | Az sym samo cvqt lilav |
| Shoot18297the1231023dwarves! | Shoot the dwarves |
| 1798No(\*&Girls)\*(09Allowed | No Girls Allowed |

## Starts and Ends With Capital Letter

Write a program that takes as input an array of strings are prints only the words that start and end with capital letter. Words are only strings that consist of English alphabet letters. **Use regex.**

|  |  |
| --- | --- |
| **Words** | **Output** |
| GoshO blabla NqmaSm1saL KvoStaA | GoshO KvoStaA |
| AZ AK 47 RoBoT noWayouT | AZ AK RoBoT |
| DrakonI Navsekyde | DrakonI |

## Character Multiplier

Create a **method** that takes two strings as arguments and returns the sum of their character codes multiplied (multiply str1.charAt (0) with str2.charAt (0) and add to the total sum). Then continue with the next two characters. If one of the strings is longer than the other, add the remaining character codes to the total sum without multiplication.

|  |  |
| --- | --- |
| **Input** | **Output** |
| Gosho Pesho | 54363 |
| 123 522 | 7647 |
| a aaaa | 9700 |

## Get First Odd or Even Elements

Write a **method** that returns the first N odd/even elements from a collection. Return as many as you can.

|  |  |
| --- | --- |
| **Input** | **Output** |
| 1 2 3 4 5  Get 3 odd | 1 3 5 |
| 11 6 2 8 1 0  Get 8 even | 6 2 8 0 |

## \*\*\*Magic exchangeable words

Write a **method** that takes as input two strings of equal length, and returns Boolean if they are exchangeable or not. Exchangeable are words where the characters in the first string can be replaced to get the second string. Example: **egg** and **add** are exchangeable, but **aabbccbb** and **nnooppzz** are not. (First **bb** corresponds to **oo**, but second **bb** corresponds to **zz**)

|  |  |
| --- | --- |
| **Input** | **Output** |
| gosho hapka | true |
| aabbaa ddeedd | true |
| foo bar | false |