# Homework: Loops, Methods, Classes

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.

## Symmetric Numbers in Range

Write a program to generate and **print all symmetric numbers in given range** [**start**…**end**] (0 ≤ **start** ≤ **end** ≤ 999). A number is symmetric if its digits are symmetric toward its middle. For example, the numbers 101, 33, 989 and 5 are symmetric, but 102, 34 and 997 are not symmetric. Examples:

|  |  |
| --- | --- |
| **Input** | **Output** |
| 5 11 | 5 6 7 8 9 11 |
| 101 110 | 101 |
| 555 777 | 555 565 575 585 595 606 616 626 636 646 656 666 676 686 696 707 717 727 737 747 757 767 777 |

## Generate 3-Letter Words

Write a program to generate and **print all 3-letter words consisting of given set of characters**. For example if we have the characters '**a**' and '**b**', all possible words will be "**aaa**", "**aab**", "**aba**", "**abb**", "**baa**", "**bab**", "**bba**" and "**bbb**". The input characters are given as string at the first line of the input. Input characters are **unique** (there are no repeating characters). Examples:

|  |  |
| --- | --- |
| **Input** | **Output** |
| x | xxx |
| ab | aaa aab aba abb baa bab bba bbb |
| abx | aaa aab aax aba abb abx axa axb axx baa bab bax bba bbb bbx bxa bxb bxx xaa xab xax xba xbb xbx xxa xxb xxx |

## Full House

In most Poker games, the "[**full house**](http://en.wikipedia.org/wiki/List_of_poker_hands#Full_house)" hand is defined as three cards of the same face + two cards of the same face, other than the first, regardless of the card's suits. The cards faces are "**2**", "**3**", "**4**", "**5**", "**6**", "**7**", "**8**", "**9**", "**10**", "**J**", "**Q**", "**K**" and "**A**". The card suits are "♣", "♦", "♥" and "♠". Write a program to generate and print all full houses and print their number. Example:

|  |
| --- |
| **Output** |
| (2♣ 2♦ 2♥ 3♣ 3♦) … (2♣ 2♦ 2♥ 3♣ 3♦) … (2♣ 2♦ 2♥ 3♣ 3♥) … (A♠ A♦ A♥ K♠ K♦) …  3744 full houses |

## \*\* Full House with Jokers

In most Poker games, the "**full house**" hand is defined as three cards of the same face + two cards of the same face, other than the first, regardless of the card's suits. The cards faces are "**2**", "**3**", "**4**", "**5**", "**6**", "**7**", "**8**", "**9**", "**10**", "**J**", "**Q**", "**K**" and "**A**". The card suits are "♣", "♦", "♥" and "♠". A special card "**Joker**" (denoted as "**\***") is used as **wildcard** and can replace any other card. Jokers do not have a suite. Jokes can be used several times in a hand. Write a program to generate and print all full houses and print their number. Example:

|  |
| --- |
| **Output** |
| (2♣ 2♦ 2♥ 3♣ 3♦) … (2♣ 2♦ 2♥ 3♣ 3♦) … (2♣ 2♦ 2♥ 3♣ 3♥) … (2♣ 2♦ 2♥ 3♣ \*) …  (2♣ \* \* 3♣ \*) … (A♠ A♥ A♦ K♠ K♣) … (A♦ A♥ A♠ \* \*) … (\* \* \* \* \*)  119808 full houses |

## Angle Unit Converter (Degrees ↔ Radians)

Write a **method** to **convert from degrees to radians**. Write a **method** to **convert from radians to degrees**. You are given a number **n** and **n** queries for conversion. Each conversion **query** will consist of a **number** + space + **measure**. Measures are "**deg**" and "**rad**". Convert all radians to degrees and all degrees to radians. Print the results as **n** lines, each holding a number + space + measure. Format all numbers with 6 digit after the decimal point. Examples:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Input** | **Output** |  | **Input** | **Output** |  | **Input** | **Output** |
| 3  180 deg  90 deg  3 rad | 3.141593 rad  1.570796rad  171.887339 deg | 2  3.141592 rad  5.5 rad | 179.999963  315.126787 | 4  0 rad  120 deg  1.55 rad  2.1 rad | 0.000000  2.094395  88.808458  120.321137 |

## Random Hands of 5 Cards

Write a program to generate **n** **random hands of 5 different cards** form a standard suit of 52 cards. Examples:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Input** | **Output** |  | **Input** | **Output** |
| 5 | Q♣ J♦ 6♠ 6♣ A♥  4♦ 7♣ 8♦ 9♣ 3♦  10♣ 8♥ 10♥ A♣ Q♥  2♥ 2♠ 2♣ 8♠ J♦  J♣ 10♦ J♠ A♠ K♥ | 3 | 10♠ 7♣ A♥ 3♣ A♦  2♦ 6♦ 10♣ 5♦ 5♣  J♥ A♣ 6♥ 6♦ J♣ |

## Days between Two Dates

Write a program to calculate the **difference between two dates** in number of days. The dates are entered at two consecutive lines in format **day-month-year**. Days are in range [1…31]. Months are in range [1…12]. Years are in range [1900…2100]. Examples:

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Input** | **Output** |  | **Input** | **Output** |  | **Input** | **Output** |  | **Input** | **Output** |
| 1-01-2014  2-01-2014 | 1 | 28-02-2000  8-03-2000 | 9 | 30-11-2014  27-03-2015 | 117 | 14-05-2014  14-06-1980 | -12387 |

## Sum Numbers from a Text File

Write a program to read a text file "**Input.txt**" holding a sequence of integer numbers, each at a separate line. Print the **sum of the numbers** at the console. Ensure you close correctly the file in case of exception or in case of normal execution. In case of exception (e.g. the file is missing), print "**Error**" as a result. Examples:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Input.txt** | **Output** |  | **Input.txt** | **Output** |  | **Input.txt** | **Output** |
| 3  5  -1 | 7 | 100  200 | 300 | (missing file) | Error |

## List of Products

Create a class **Product** to hold products, which have **name** (string) and **price** (decimal number). Read from a text file named "**Input.txt**" a **list of products**. Each product will be in format **name** + space + **price**. You should hold the products in objects of class **Product**. **Sort** the products **by price** and write them in format **price** +space+ **name** in a file named "**Output.txt**". Ensure you close correctly all used resources. Examples:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Input.txt** | **Output.txt** |  | **Input.txt** | **Output.txt** |
| milk 2.80  apple 1.20  coffee 8.50 | 1.20 apple  2.80 milk  8.50 coffee | juice 2.50  water 1.20  vodka 18.70  beer 1.12 | 1.12 beer  1.20 water  2.50 juice  18.70 vodka |

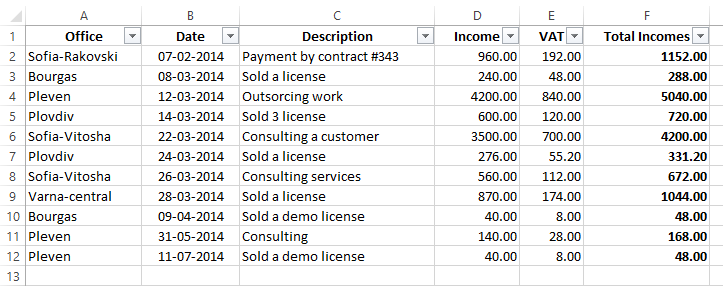
## \* Order of Products

Create a class **Product** to hold products, which have **name** (string) and **price** (decimal number). Read from a text file named "**Products.txt**" a **list of product with prices** and keep them in a list of products. Each product will be in format **name** + **space** + **price**. You should hold the products in objects of class **Product**. Read from a text file named "**Order.txt**" an order of products with quantities. Each order line will be in format **product** + space + **quantity**. Calculate and print in a text file "**Output.txt**" the **total price** of the order. Ensure you close correctly all used resources. Examples:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Products.txt** | **Order.txt** | **Output.txt** |  | **Input.txt** |  | **Output.txt** |
| milk 1.80  apple 3.20  coffee 8.50 | 12 milk  3.2 coffee  2 coffee  1.5 apple | 70.5 | juice 2.50  water 1.20  vodka 18.70  beer 1.12 | 15 water  2 vodka  3 juice  1 water | 64.1 |

## \*\*\* Excel

You are given an Excel file **Incomes-Report.xlsx** holding an incomes report in the following format:



Each office puts in this Excel file all their incomes (office, date, description, income, 20% VAT, total income). Your task is to **read the report** and to calculate the **incomes sub-totals for each office** (with VAT). Order the offices alphabetically. Print the result at the console in format **town** Total -> **incomes**. Finally calculate and print the grand total (the sum of all incomes in all offices). Sample output (for the above report):

|  |
| --- |
| **Output** |
| Bourgas Total -> 336.00  Pleven Total -> 5256.00  Plovdiv Total -> 1051.20  Sofia-Rakovski Total -> 1152.00  Sofia-Vitosha Total -> 4872.00  Varna-central Total -> 1044.00  Grand Total -> 13711.20 |

You are free to use a Java library of choice to open and read Excel spreadsheets (**.xlsx** files).