# Lab: Nested Loops

Tasks for exercise in class and for homework to the course ["Programming Fundamentals and Unit Testing" @ SoftUni](https://softuni.bg/trainings/4256/programming-fundamentals-and-unit-testing-september-2023).

Test your tasks in the Judge system: <https://judge.softuni.org/Contests/4416>

## Numbers From N to 1

Write a program that:

* **Reads an integer number** **N** from the console
* **Prints the numbers** from **N to 1**, each on separate line

## Example Input / Output

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Input** | **Output** |  | **Input** | **Output** |
| 2 | 2  1 | 4 | 4  3  2  1 |

## Even Powers of 2

Write aprogram that:

* Reads an **integer** **number** n from the console
* Prints on the console the number two on **even powers in the range [0; n]**

**2** **≤** **2n**: **20**, **22**, **24**, **26**, …, **2n**.

## Example Input / Output

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Input** | **Output** |  | **Input** | **Output** |  | **Input** | **Output** |  | **Input** | **Output** |  | **Input** | **Output** |
| 3 | 1  4 | 4 | 1  4  16 | 5 | 1  4  16 | 6 | 1  4  16  64 | 7 | 1  4  16  64 |

## Triangle of Stars

Write a program to print a **triangle of stars** like shown in the examples:

* Read the **size (integer number)** of a triangle from the console
* Print a **triangle of stars**

## Example Input / Output

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Input** | **Output** |  | **Input** | **Output** |
| 5 | \*  \*\*  \*\*\*  \*\*\*\*  \*\*\*\*\* | 7 | \*  \*\*  \*\*\*  \*\*\*\*  \*\*\*\*\*  \*\*\*\*\*\*  \*\*\*\*\*\*\* |

## Building

Write a program to **print a table**, representing a **building**:

* Reads **two integer numbers** from the console: **floors count** and **estates count** per floor
* Identifiers consist of: **{type}{floor}{number}**, e.g. **L65**, **A12**, **O24**
* **Odd** floors hold **apartments** (type **A**), e.g. **A10**, **A11**, **A12**, …
* **Even** floors hold **offices** (type **O**), e.g. **O20**, **O21**, **O22**, …
* The **last floor** holds large apartments (type **L**), e.g. **L60**, **L61**, **L62**

## Example Input / Output

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Input** | **Output** |  | **Input** | **Output** |
| 6  4 | L60 L61 L62 L63  A50 A51 A52 A53  O40 O41 O42 O43  A30 A31 A32 A33  O20 O21 O22 O23  A10 A11 A12 A13 | 5  3 | L50 L51 L52  O40 O41 O42  A30 A31 A32  O20 O21 O22  A10 A11 A12 |

## Number Pyramid

Write a program that:

* Reads an integer number **n** from the console
* Prints a **pyramid of numbers** as shown in the examples

## Example Input / Output

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Input** | **Output** |  | **Input** | **Output** |  | **Input** | **Output** |  | **Input** | **Output** |
| 7 | 1  2 3  4 5 6  7 | 10 | 1  2 3  4 5 6  7 8 9 10 | 12 | 1  2 3  4 5 6  7 8 9 10  11 12 | 15 | 1  2 3  4 5 6  7 8 9 10  11 12 13 14 15 |

## Travel Savings

Write a program that calculate the **money collection** for multiple travel destinations:

* Read a **destination (string)** and **needed budget (floating-point number)** for the destination
* Read many times amounts of collected money, until they are **enough** for the destination (starting from 0)
  + Print:

"**Collected: {sum}**" where sum is formatted to 2nd digit

or

"**Going to {destination}**"

* Read another destination and budget and collect money again
* A destination "**End**" ends the program

## Example Input / Output

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Input** | **Output** |  | **Input** | **Output** |
| Bali  3500  800  1800  1000  Brazil  4600  5000  End | Collected: 800.00  Collected: 2600.00  Collected: 3600.00  Going to Bali!  Collected: 5000.00  Going to Brazil! | Spain  4000  1000  1500  1500  Greece  800  400  500  End | Collected: 1000.00  Collected: 2500.00  Collected: 4000.00  Going to Spain!  Collected: 400.00  Collected: 900.00  Going to Greece! |

## Sum of Digits Calculator

Write a program that:

* Continuously **read integers** until "**End**" is entered from the console
  + Print the **sum of digits** for each integer, use the following format:

"**Sum of digits = {sum}**"

* Finally, print "**Goodbye**"

## Example Input / Output

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Input** | **Output** |  | **Input** | **Output** |
| 157  99  5  438  End | Sum of digits = 13  Sum of digits = 18  Sum of digits = 5  Sum of digits = 15  Goodbye | 107  345  98  23  End | Sum of digits = 8  Sum of digits = 12  Sum of digits = 17  Sum of digits = 5  Goodbye |

## Prime Numbers

Write a program that**:**

* Reads two integer numbers: **start of the range** and **end of the range**
* Print **all prime numbers** in given range

**Hint:** A prime number is a positive integer greater than 1 that has exactly two distinct positive divisors: 1 and itself.

## Example Input / Output

|  |  |
| --- | --- |
| **Input** | **Output** |
| 5  50 | 5 7 11 13 17 19 23 29 31 37 41 43 47 |

|  |  |
| --- | --- |
| **Input** | **Output** |
| 20  30 | 23 29 |