Alexandria University
Faculty of Computers and Data Science
NLO Fall'25

Task 2

Instructions:

1. Download the provided starter file from this link
2. Insert your implementation inside the file **without** changing any variable names, function names, or structure. Don't delete anything written in the code. You can't import anymore libraries, and you can't add other functions.
3. Make sure that your function returns the values in the correct format as written in the function description in the starter code. **This is crucial for it to pass my test runs**
4. Save your final submission with the following naming format: studentName_studentID.py
   Example: HagarHazem_202211.py
5. Submit your .py file to this form **(Deadline: Thursday 6/11 11:59 PM)**

Requirements:

You are expected to implement **from scratch** Lagrange approach for solving equality constrained univariate and multivariate problems.

Rules:

- Cheating or code sharing (in any form) will result in a zero mark for both parties **(non-negotiable)**.
- Use of AI-generated code is strictly prohibited. If detected, the mark for this assignment will be 0.

Examples:

1. Max $2x + y + 10$
   $s.t. \quad x + 2y^2 = 3$

```
Lagrange_Equality('2 * x_0 + x_1 + 10', ['x_0 + 2 * x_1**2 - 3'], n_vars=2, minimize=False)
```

```
([2.9688, 0.125], 16.0625)
```

2. Min $x^2 + y^2 + z^2$
   $s.t. \quad x + 2y + 3z = 7, \quad 2x + 2y + z = \frac{9}{2}$

```
Lagrange_Equality('x_0**2 + x_1**2 + x_2**2', ['x_0 + 2 * x_1 + 3 * x_2 - 7', '2 * x_0 + 2 * x_1 + x_2 - 4.5'], n_vars=3, minimize=True)
```

```
([0.5, 1.0, 1.5], 3.5)
```