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| **Practicum Case** |  |
| MATH6183 | MATH6183001 | MATH6183016 | MATH6183049  Scientific Computing |
| **Mathematics & Statistics** | **E231-MATH6183-JJ01-02** |
| ***Valid on*** *Even Semester Year 2022/2023* | **Revision 00** |

## Learning Outcomes

* LO2 – solve the systems of linear algebraic equations, eigenvalues, eigenvectors, regression and interpolation through scientific computation

## Topic

* Session 02 – System of Linear Equation

## Subtopics

* Gauss-Seidel Linear Equation
* NumPy

## Soal

*Case*

**Solving Linear Equation**

Solve the following **system of linear equations** with the following **requirements**:

* You must determine whether the **equations** are **diagonally** **dominant** **programmatically**.If the equation is **not diagonal**,then **print error message.**
* If the equations are **diagonally dominant**, use **Gauss-Seidel method** and the number **15** as the **maximum** **iterations**. **Otherwise**, show a **message** telling the equations are **not** **diagonally** **dominant**.
* Use a **pre-defined threshold**
* Use the **value 0** as the **initial value** of x1, x2,x3, and x4.

Then, **show the result** for each equations and check whether the equations below are **convergent** **or not** and print the value of x1, x2, x3, and x4 in each iteration.

Below are the **systems of linear equations** that you need to solve:

Below are the **snippet code** for the equations above:

Xs = [

    [

      [4, 2, -1],

      [1, -5, 2],

      [2, -1, -4]

    ],

    [

      [3, 4, 5],

      [-3, 7, -4],

      [1, -4, -2]

    ],

    [

      [9, -2, 3, 2],

      [2, 8, -2, 3],

      [-3, 2, 11, -4],

      [-2, 3, 2, 10]

    ]

]

Ys = [

    [41, -10, 1],

    [34, -32, 62],

    [55, -14, 12, -21]

]

Text

Description automatically generated

**Figure 1. Gauss Seidel Result with Epsilon 0.022**