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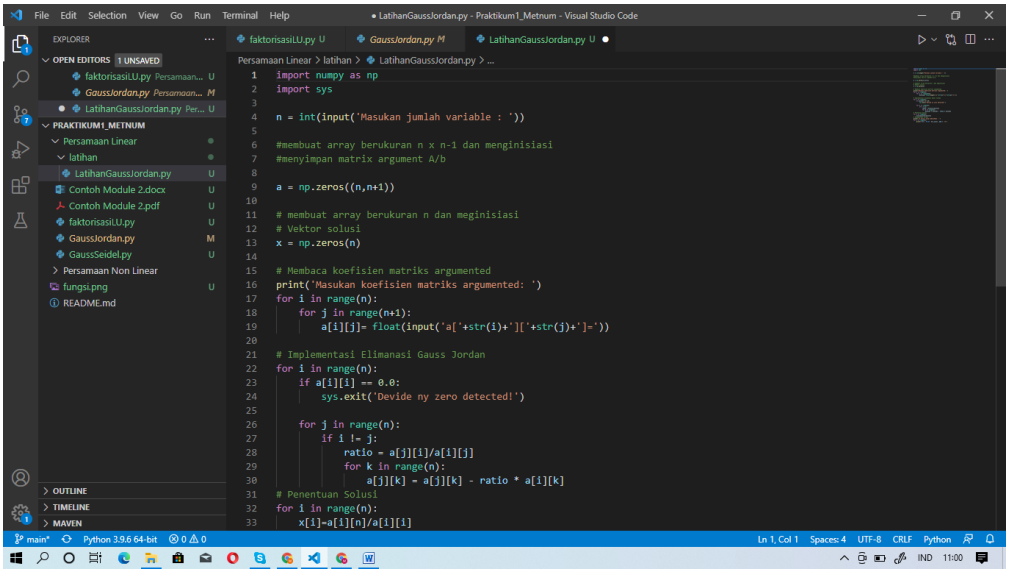
Latihan :
Selesaikan :

$$4x_1 + 3x_2 - x_3 = -4$$
$$-2x_1 - 4x_2 + 5x_3 = 40$$
$$x_1 + 2x_2 + 6x_3 = 14$$

Sistem persamaan linear di atas dengan Metode :

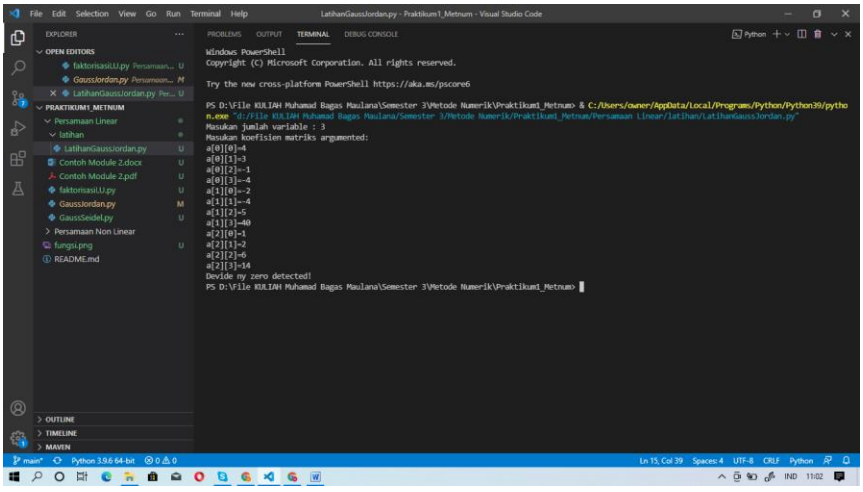
1. Eliminasi Gauss Jordan

Source Code



```python
import numpy as np
import sys

n = int(input('Masukan jumlah variable : '))

#membuat array berukuran n x n-1 dan menginisiasi
#menyimpan matrix argument A/b

a = np.zeros((n,n+1))

# membuat array berukuran n dan meginisiasi
# Vektor solusi
x = np.zeros(n)

# Membaca koefisien matriks argumented
print('Masukan koefisien matriks argumented: ')
for i in range(n):
    for j in range(n+1):
        a[i][j]= float(input('a['+str(i)+']['+str(j)+']='))

# Implementasi Elimanasi Gauss Jordan
for i in range(n):
    if a[i][i] == 0.0:
        sys.exit('Devide ny zero detected!')

    for j in range(n):
        if i != j:
            ratio = a[j][i]/a[i][j]
            for k in range(n):
                a[j][k] = a[j][k] - ratio * a[i][k]
# Penentuan Solusi
for i in range(n):
    x[i]=a[i][n]/a[i][i]
```

Hasil



```
Windows PowerShell
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Try the new cross-platform PowerShell https://aka.ms/pscore6

PS D:\File KULIAH Muhamad Bagas Maulana\Semester 3\Metode Numerik\Praktikum1_Metnum> & C:/Users/owner/AppData/Local/Programs/Python/Python39/python.exe "d:/File KULIAH Muhamad Bagas Maulana/Semester 3/Metode Numerik/Praktikum1_Metnum/Persamaan Linear/latihan/LatihanGaussJordan.py"
Masukan jumlah variable : 3
Masukan koefisien matriks argumented:
a[0][0]=4
a[0][1]=3
a[0][2]=-1
a[0][3]=-4
a[1][0]=-2
a[1][1]=-4
a[1][2]=5
a[1][3]=40
a[2][0]=1
a[2][1]=2
a[2][2]=6
a[2][3]=14
Devide ny zero detected!
PS D:\File KULIAH Muhamad Bagas Maulana\Semester 3\Metode Numerik\Praktikum1_Metnum>
```
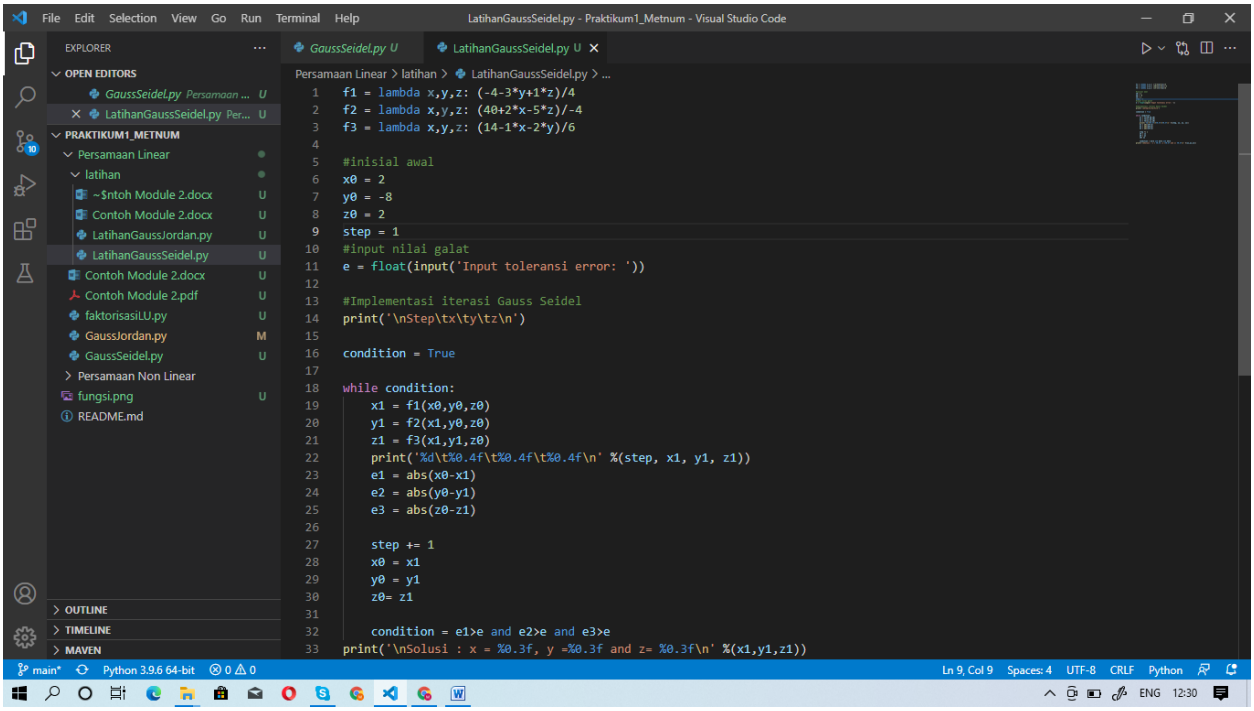
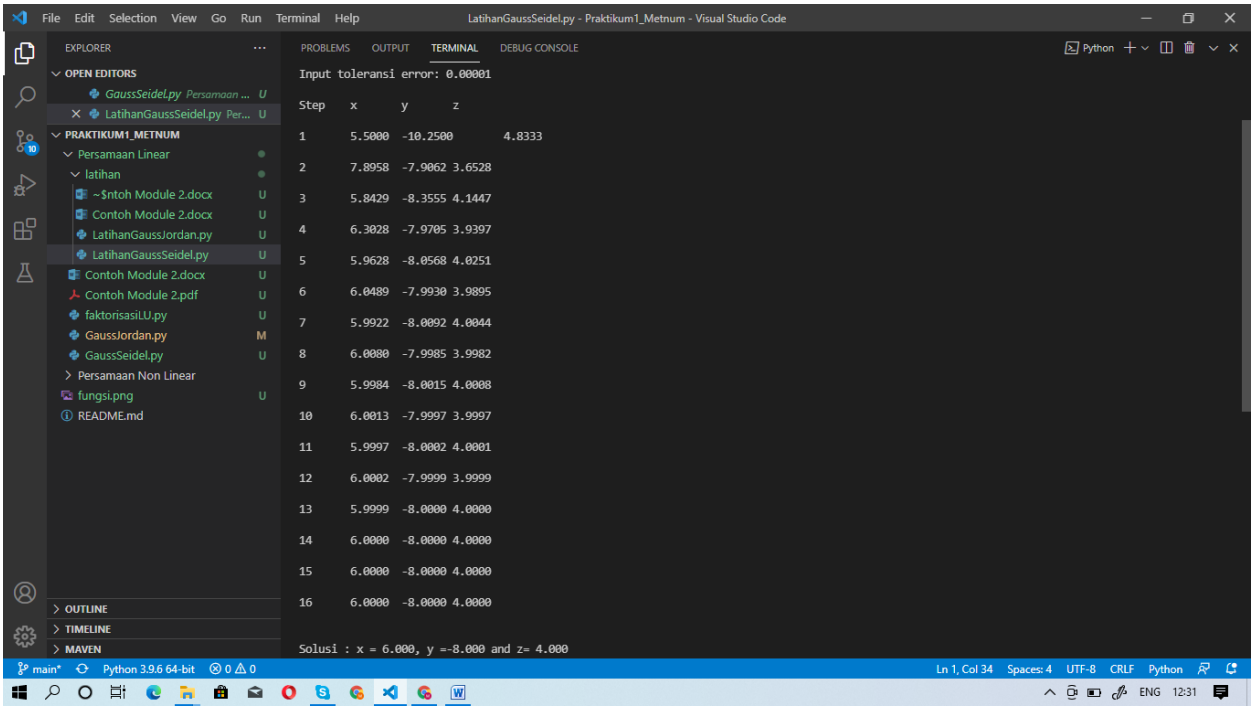

2. Iterasi Gauss-Sidel dengan nilai awal (2,-8,2), dan solusi sejatinya berdasarkan perhitungan (a).

Source Code



```
f1 = lambda x,y,z: (-4-3*y+1*z)/4
f2 = lambda x,y,z: (40+2*x-5*z)/-4
f3 = lambda x,y,z: (14-1*x-2*y)/6

#inisial awal
x0 = 2
y0 = -8
z0 = 2
step = 1
#input nilai galat
e = float(input('Input toleransi error: '))

#Implementasi iterasi Gauss Seidel
print('\nStep\tx\ty\tz\n')

condition = True

while condition:
    x1 = f1(x0,y0,z0)
    y1 = f2(x1,y0,z0)
    z1 = f3(x1,y1,z0)
    print('%d\t%0.4f\t%0.4f\t%0.4f\n' %(step, x1, y1, z1))
    e1 = abs(x0-x1)
    e2 = abs(y0-y1)
    e3 = abs(z0-z1)

    step += 1
    x0 = x1
    y0 = y1
    z0= z1

    condition = e1>e and e2>e and e3>e
print('\nSolusi : x = %0.3f, y =%0.3f and z= %0.3f\n' %(x1,y1,z1))
```

Hasil



```
Input toleransi error: 0.00001

Step    x       y       z

1       5.5000  -10.2500        4.8333

2       7.8958  -7.9062 3.6528

3       5.8429  -8.3555 4.1447

4       6.3028  -7.9705 3.9397

5       5.9628  -8.0568 4.0251

6       6.0489  -7.9930 3.9895

7       5.9922  -8.0092 4.0044

8       6.0080  -7.9985 3.9982

9       5.9984  -8.0015 4.0008

10      6.0013  -7.9997 3.9997

11      5.9997  -8.0002 4.0001

12      6.0002  -7.9999 3.9999

13      5.9999  -8.0000 4.0000

14      6.0000  -8.0000 4.0000

15      6.0000  -8.0000 4.0000

16      6.0000  -8.0000 4.0000

Solusi : x = 6.000, y =-8.000 and z= 4.000
```

3. Berdasarkan jawaban 1 dan 2,apa yang dapat kalian simpulkan?

Dapat disimpulkan bahwa metode Gauss Seidel lebih efektif digunakan pada persamaan linear dari pada Gauss Jordan.