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## PRAKTIKUM 2 METNUM

### Lat Gaus Seidel

+ Code + Text

```
print('\nSolusi: x=%0.3f, y=%0.3f and z = %0.3f\n'% (x1,y1,z1))
```

```
Input Toleransi error: 0.00001

Step    x       y       z

1       -7.0000 -16.0000        -3.0000

2       -13.0000        -12.7500        -1.9167

3       -10.5625        -12.8854        -1.9618

4       -10.6641        -12.8798        -1.9599

5       -10.6598        -12.8800        -1.9600

6       -10.6600        -12.8800        -1.9600

Solusi: x=-10.660, y=-12.880 and z = -1.960

Input Toleransi error: 
```

# Iterasi Gauss Seidel

# Definisikan Persamaan yang akan diselesaikan
# Dalam bentuk dominan secara diagonal
# Iterasi Gauss Seidel

```
# Definisikan Persamaan yang akan diselesaikan
# Dalam bentuk dominan secara diagonal
f1 = lambda x,y,z: (-4+3*y-0*z)/4
f2 = lambda x,y,z: (40-2*x+5*z)/-4
f3 = lambda x,y,z: (14+0*x+2*y)/6

# Inisial awal
x0 = 2
y0 = -8
z0 = 2
step = 1

# Input nilai galat/error
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))

# Inisial awal
x0 = 1
y0 = 2
z0 = 2
step = 1

# Input nilai galat/error
```

```
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))

# Inisial awal
x0 = 1
y0 = 2
z0 = 2
step = 1

# Input nilai galat/error
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))

# Inisial awal
x0 = 1
y0 = 2
z0 = 2
step = 1

# Input nilai galat/error
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))
```

## Gauss Jordan

\+ Code + Text

```
# Penentuan Solusi
for i in range(n):
    x[i] = a[i][n]/a[i][i]

# Menampilkan Solusi
print('\nSolusi yang di butuhkan: ')
for i in range(n):
    print('X%d = %0.6f' %(i,x[i]), end = '\t')
```

```
Masukan jumlah variabel: 3
Masukan koefisien matriks augmented:
a[0][0]=-0.2
a[0][1]=-0.3
a[0][2]=7.85
a[0][3]=0.2
a[1][0]=8
a[1][1]=-0.5
a[1][2]=-20.5
a[1][3]=0.3
a[2][0]=-0.2
a[2][1]=15
a[2][2]=80.5
a[2][3]=10

Solusi yang di butuhkan:
X0 = 0.182239   X1 = 0.421086   X2 = 0.046213
```

```
import numpy as np
import sys

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

# Membuat array berukuran n x n+1 dan menginisiasi
# Menyimpan matriks augmented A | b
a = np.zeros((n,n+1))

# Membuat array berukuran n dan menginisiasi
# Vektor solusi
x =  np.zeros(n)

# Membaca kofisien matrik augmented
print('Masukan koefisien matriks augmented: ')
for i in range(n):
```

```
    for j in range(n+1):
        a[i][j] =  float(input( 'a[' +str(i)+'][' +str(j)+']='))

# Implementasi Eliminasi Gaus Jordan
for i in range (n):
    if a[i][j] == 0.0:
        sys.exit('Divide by zero detected!: ')

    for j in range(n):
        if i != j:
            ratio = a[j][i]/a[i][i]

            for k in range(n+1):
                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]

# Menampilkan Solusi
print('\nSolusi yang di butuhkan: ')
for i in range(n):
    print('X%d = %0.6f' %(i,x[i]), end = '\t')
```

## Faktorisasi

+ Code + Text

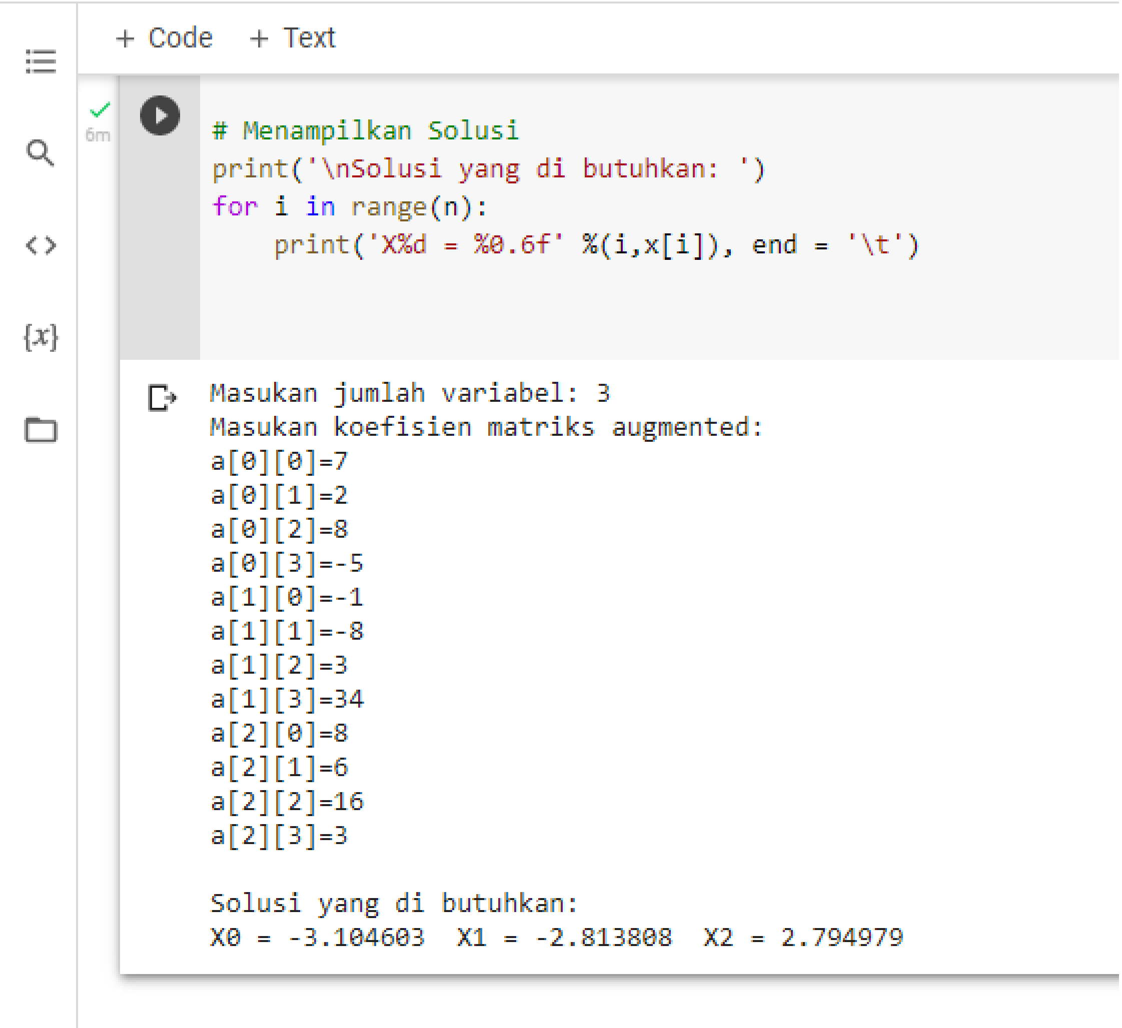
```
print ('Matriks P :\n ',P)
print ('Matriks L :\n ',L)
print ('Matriks U :\n ',U)
print ('Solutions :\n ',x)
```

```
Matriks P :
  [[1. 0. 0.]
 [0. 1. 0.]
 [0. 0. 1.]]
Matriks L :
  [[ 1.          0.          0.        ]
 [ 0.03333333  1.          0.        ]
 [ 0.1        -0.02712994  1.        ]]
Matriks U :
  [[ 3.         -0.1        -0.2       ]
 [ 0.          7.00333333 -0.29333333]
 [ 0.          0.         10.01204188]]
Solutions :
  [ 3.00074161 -2.4785646   7.00040646]
```

---

```
import scipy
from scipy.linalg import lu, lu_factor, lu_solve
import numpy as np

# Definisikan matriks A
A = np.array([[3., -0.1, -0.2], [0.1, 7., -0.3], [0.3, -0.2, 10]])

# Definisikan vektor b
b = np.array([7.85, -19.15, 71.4])
# Solusi yang diberikan Lu dan b
P, L, U = lu(A)
lu, piv = lu_factor(A)
x = lu_solve((lu, piv),b)
print ('Matriks P :\n ',P)
print ('Matriks L :\n ',L)
print ('Matriks U :\n ',U)
print ('Solutions :\n ',x)
```

**Lat Gaus Jordan**


+ Code + Text

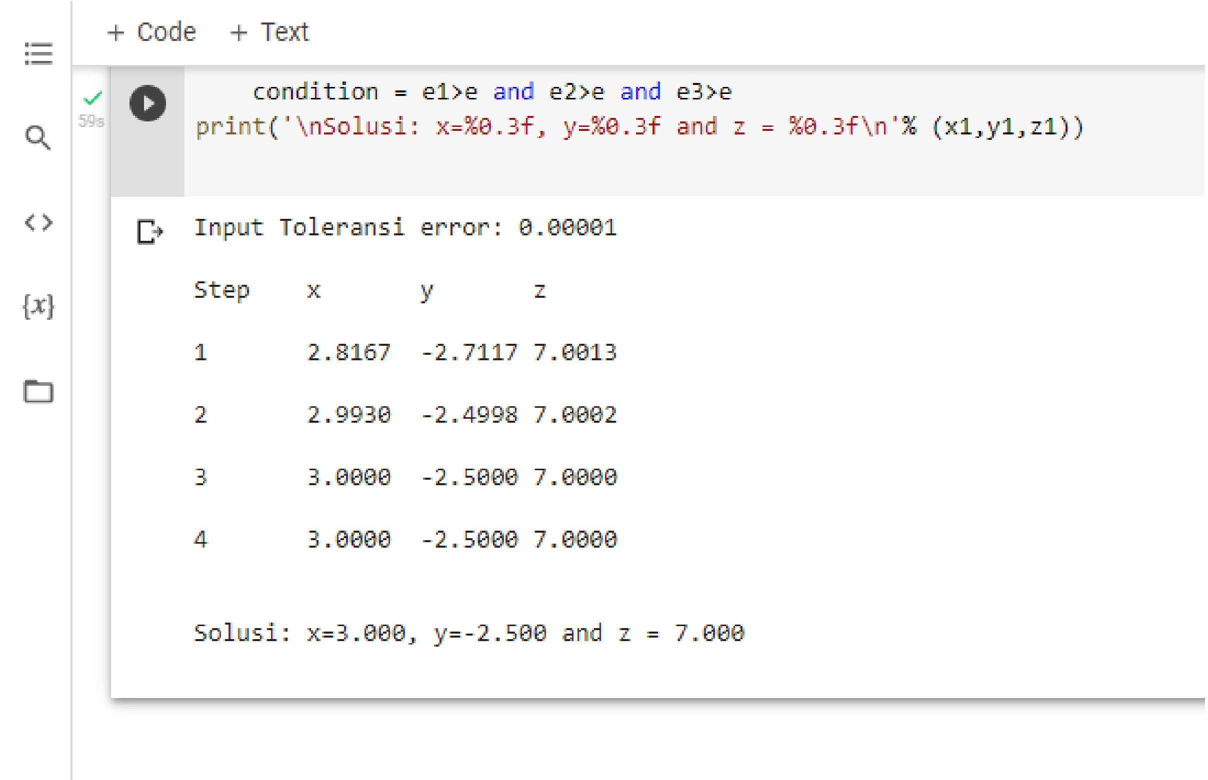
```python
# Menampilkan Solusi
print('\nSolusi yang di butuhkan: ')
for i in range(n):
    print('X%d = %0.6f' %(i,x[i]), end = '\t')
```

```
Masukan jumlah variabel: 3
Masukan koefisien matriks augmented:
a[0][0]=7
a[0][1]=2
a[0][2]=8
a[0][3]=-5
a[1][0]=-1
a[1][1]=-8
a[1][2]=3
a[1][3]=34
a[2][0]=8
a[2][1]=6
a[2][2]=16
a[2][3]=3

Solusi yang di butuhkan:
X0 = -3.104603   X1 = -2.813808   X2 = 2.794979
```

```
import numpy as np
import sys

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

# Membuat array berukuran n x n+1 dan menginisiasi
# Menyimpan matriks augmented A | b
a = np.zeros((n,n+1))

# Membuat array berukuran n dan menginisiasi
# Vektor solusi
x =  np.zeros(n)
```

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

# Implementasi Eliminasi Gaus Jordan
for i in range (n):
   if a[i][j] == 0.0:
      sys.exit('Divide by zero detected!: ')

   for j in range(n):
      if i != j:
         ratio = a[j][i]/a[i][i]

         for k in range(n+1):
            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]

# Menampilkan Solusi
print('\nSolusi yang di butuhkan: ')
for i in range(n):
   print('X%d = %0.6f' %(i,x[i]), end = '\t')
```

## Gaus Seidel



```
+ Code   + Text

    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))
```

```
Input Toleransi error: 0.00001

Step    x       y       z

1       2.8167  -2.7117 7.0013

2       2.9930  -2.4998 7.0002

3       3.0000  -2.5000 7.0000

4       3.0000  -2.5000 7.0000


Solusi: x=3.000, y=-2.500 and z = 7.000
```

---

```
# Iterasi Gauss Seidel

# Definisikan Persamaan yang akan diselesaikan
# Dalam bentuk dominan secara diagonal
f1 = lambda x,y,z: (7.85+0.1*y+0.2*z)/3
f2 = lambda x,y,z: (-19.3-0.1*x+0.3*z)/7
f3 = lambda x,y,z: (71.4-0.3*x+0.2*y)/10

# Inisial awal
x0 = 1
y0 = 2
z0 = 2
step = 1

# Input nilai galat/error
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))
```