UJIAN AKHIR SEMESTER

ALJABAR LINEAR

Oleh:

KELOMPOK I

KELAS F

ABDUL ASIS	**D0221341**
ADELIA PUTRI	**D0221338**
HENDRA USMAN	**D0221079**
MUH. HARUN AL-RASYID	**D0221347**
NUR SAIDA	**D0221344**
RISKA AMALIA	**D0221340**

PROGRAM STUDI INFORMATIKA
FAKULTAS TEKNIK
UNIVERSITAS SULAWESI BARAT
MAJENE
2022

1. Ubahlah matriks A berikut menjadi sebuah matriks invers A dengan menggunakan operasi baris elementor.

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 5 & 3 \\ 1 & 0 & 8 \end{bmatrix}$$

Jawab:

$$[\,A\,|\,I\,] = \begin{bmatrix} 1 & 2 & 3 & | & 1 & 0 & 0 \\ 2 & 5 & 3 & | & 0 & 1 & 0 \\ 1 & 0 & 8 & | & 0 & 0 & 1 \end{bmatrix}$$

$$= \begin{bmatrix} 1 & 2 & 3 & | & 1 & 0 & 0 \\ 0 & 1 & -3 & | & -2 & 1 & 0 \\ 0 & -2 & -5 & | & -1 & 0 & 1 \end{bmatrix} \text{B2-2.B1 -> B2, B3-B1 -> B3}$$

$$= \begin{bmatrix} 1 & 2 & 3 & | & 1 & 0 & 0 \\ 0 & 1 & -3 & | & -2 & 1 & 0 \\ 0 & 0 & -1 & | & -5 & 2 & 1 \end{bmatrix} \text{B3+2.B2 -> B3}$$

$$= \begin{bmatrix} 1 & 2 & 3 & | & 1 & 0 & 0 \\ 0 & 1 & -3 & | & -2 & 1 & 0 \\ 0 & 0 & 1 & | & 5 & -2 & -1 \end{bmatrix} \text{(-1).B3 -> B3}$$

$$= \begin{bmatrix} 1 & 2 & 0 & | & -14 & 6 & 3 \\ 0 & 1 & 0 & | & 13 & -5 & -3 \\ 0 & 0 & 1 & | & 5 & -2 & -1 \end{bmatrix} \text{B1-3.B3 -> B1, B2+3.B3 -> B2}$$

$$= \begin{bmatrix} 1 & 0 & 0 & | & -40 & 16 & 9 \\ 0 & 1 & 0 & | & 13 & -5 & -3 \\ 0 & 0 & 1 & | & 5 & -2 & -1 \end{bmatrix} \text{B1-2.B2 -> B1}$$

$$[I|\,A^{-1}\,] = \begin{bmatrix} 1 & 0 & 0 & | & -40 & 16 & 9 \\ 0 & 1 & 0 & | & 13 & -5 & -3 \\ 0 & 0 & 1 & | & 5 & -2 & -1 \end{bmatrix}$$

Jadi, invers matriks A adalah $A^{-1} = \begin{bmatrix} -40 & 16 & 9 \\ 13 & -5 & -3 \\ 5 & -2 & -1 \end{bmatrix}$

2. Tentukan invers matriks sesuai dengan petunjuk berikut:

```
row1 = [1, 2, 3]
row2 = [2, 8, 7]
row3 = [1, 5, 6]

print(row1)
print(row2)
print(row3)

det = (row1[0]*row2[1]*row3[2]+
       row1[1]*row2[2]*row3[0]+
       row1[2]*row2[0]*row3[1]-
       row1[2]*row2[1]*row3[0]-
       row1[0]*row2[2]*row3[1]-
       row1[1]*row2[0]*row3[2])
print("Determinan matriks:", det)

a11 = row2[1]*row3[2]-row2[2]*row3[1]
a12 = (-1*((row2[0]*row3[2])-(row2[2]*row3[0])))
a13 = row2[0]*row3[1]-row2[1]*row3[0]

a21 = (-1*((row1[1]*row3[2])-(row1[2]*row3[1])))
a22 = row1[0]*row3[2]-row1[2]*row3[0]
a23 = (-1*((row1[0]*row3[1])-(row1[1]*row3[0])))
```

```
a31 = row1[1]*row2[2]-row1[2]*row2[1]
a32 = (-1*((row1[0]*row2[2])-(row1[2]*row2[0])))
a33 = row1[0]*row2[1]-row1[1]*row2[0]

print("\nKofaktor Matriks:")
print("|", a11, a12, a13, "|")
print("|", a21, a22, a23, "|")
print("|", a31, a32, a33, "|")
```

Lanjutkan penyelesaian program di atas untuk mendapatkan invers matriks 3x3, dengan langkah-langkah berikut:

a. Tent. **adjoin**nya.

$$\text{adj}(A) = (\text{kof}(A))^T$$

b. Tent. hasil **invers**nya, (pembulatan 2 angka dibelakang koma).

$$A^{-1} = \frac{1}{\det A} \text{adj}(A)$$

Jawab:

```python
row1 = [1, 2, 3]
row2 = [2, 8, 7]
row3 = [1, 5, 6]

print(row1)
print(row2)
print(row3)

det = (row1[0]*row2[1]*row3[2]+
       row1[1]*row2[2]*row3[0]+
       row1[2]*row2[0]*row3[1]-
       row1[2]*row2[1]*row3[0]-
       row1[0]*row2[2]*row3[1]-
       row1[1]*row2[0]*row3[2])
print("Determinan Matriks: ", det)

a11 = row2[1]*row3[2]-row2[2]*row3[1]
a12 = (-1*((row2[0]*row3[2])-(row2[2]*row3[0])))
a13 = row2[0]*row3[1]-row2[1]*row3[0]

a21 = (-1*((row1[1]*row3[2])-(row1[2]*row3[1])))
a22 = row1[0]*row3[2]-row1[2]*row3[0]
a23 = (-1*((row1[0]*row3[1])-(row1[1]*row3[0])))

a31 = row1[1]*row2[2]-row1[2]*row2[1]
a32 = (-1*((row1[0]*row2[2])-(row1[2]*row2[0])))
a33 = row1[0]*row2[1]-row1[1]*row2[0]

print("\nKofaktor Matriks: ")
print("|", a11, a12, a13, "|")
print("|", a21, a22, a23, "|")
print("|", a31, a32, a33, "|")
```

a. Adjoin:

```python
print("\nAdjoin Matriks: ")
print("|", a11, a21, a31, "|")
print("|", a12, a22, a32, "|")
print("|", a13, a23, a33, "|")
```

Atau dengan cara:

```python
print("\nAdjoin Matriks: ")
matriks_kofaktor = [[a11, a12, a13],
                    [a21, a22, a23],
                    [a31, a32, a33]]

matriks_0 = [[0, 0, 0],
             [0, 0, 0],
             [0, 0, 0]]

for i in range(len(matriks_kofaktor)):
        for j in range(len(matriks_kofaktor[0])):
                matriks_0[j][i] = matriks_kofaktor[i][j]
for matriks_kofaktor in matriks_0 :
        print(matriks_kofaktor)
```

b. Invers:

```python
print("\nInvers Matriks: ")
print("|", round(1/det*a11, 2), round(1/det*a21, 2), round(1/det*a31, 2), "|")
print("|", round(1/det*a12, 2), round(1/det*a22, 2), round(1/det*a32, 2), "|")
print("|", round(1/det*a13, 2), round(1/det*a23, 2), round(1/det*a33, 2), "|")
```

3. Buatlah program penyelesaian transformasi **translasi** pada garis yang menghubungkan titik (1,1), (7, 1) dan (4, 5) dengan translasi sejauh **tx = 2** dan **ty = 3.**

Jawab:

```python
print("\nPROGRAM TRANSLASI")
x1_awal = int(input("Masukkan Nilai x1: "))
y1_awal = int(input("Masukkan Nilai y1: "))
x2_awal = int(input("Masukkan Nilai x2: "))
y2_awal = int(input("Masukkan Nilai y2: "))
x3_awal = int(input("Masukkan Nilai x3: "))
y3_awal = int(input("Masukkan Nilai y3: "))

print("\nPosisi Awal")
print("titik 1: ",x1_awal,",",y1_awal)
print("titik 2: ",x2_awal,",",y2_awal)
print("titik 3: ",x3_awal,",",y3_awal)

tx = int(input("Masukkan Nilai Translasi x: "))
ty = int(input("Masukkan Nilai Translasi y: "))

print("\nPosisi Akhir")
print("titik 1: ",x1_awal+tx,",",y1_awal+ty)
print("titik 2: ",x2_awal+tx,",",y2_awal+ty)
print("titik 3: ",x3_awal+tx,",",y3_awal+ty)
```

Output:

```
PROGRAM TRANSLASI
Masukkan Nilai x1: 1
Masukkan Nilai y1: 1
Masukkan Nilai x2: 7
Masukkan Nilai y2: 1
Masukkan Nilai x3: 4
Masukkan Nilai y3: 5

Posisi Awal
titik 1:  1 , 1
titik 2:  7 , 1
titik 3:  4 , 5
Masukkan Nilai Translasi x: 2
Masukkan Nilai Translasi y: 3

Posisi Akhir
titik 1:  3 , 4
titik 2:  9 , 4
titik 3:  6 , 8
```

Atau dengan cara:

```python
print("\nPROGRAM TRANSLASI")
x1_awal = 1
y1_awal = 1
x2_awal = 7
y2_awal = 1
x3_awal = 4
y3_awal = 5

print("\nPosisi Awal")
print("titik 1: ",x1_awal,",",y1_awal)
print("titik 2: ",x2_awal,",",y2_awal)
print("titik 3: ",x3_awal,",",y3_awal)

tx = 2
ty = 3

print("\nPosisi Akhir")
print("titik 1: ",x1_awal+tx,",",y1_awal+ty)
print("titik 2: ",x2_awal+tx,",",y2_awal+ty)
print("titik 3: ",x3_awal+tx,",",y3_awal+ty)
```

Output:

```
PROGRAM TRANSLASI

Posisi Awal
titik 1:  1 , 1
titik 2:  7 , 1
titik 3:  4 , 5

Posisi Akhir
titik 1:  3 , 4
titik 2:  9 , 4
titik 3:  6 , 8
```