

```
In [1]: #membuat matrik menggunakan List
mat = [2.0,5.0,9.0]
mat
```

```
Out[1]: [2.0, 5.0, 9.0]
```

```
In [2]: mat = [[2.0,5.0,9.0],[2.0,5.0,9.0]]
mat
```

```
Out[2]: [[2.0, 5.0, 9.0], [2.0, 5.0, 9.0]]
```

```
In [3]: mat = [[[2.0,5.0,9.0],[2.0,5.0,9.0]],[[2.0,5.0,9.0],[2.0,5.0,9.0]]]
mat
```

```
Out[3]: [[[2.0, 5.0, 9.0], [2.0, 5.0, 9.0]], [[2.0, 5.0, 9.0], [2.0, 5.0, 9.0]]]
```

```
In [4]: mat = [2.0,5.0,9.0]
mat
```

```
Out[4]: [2.0, 5.0, 9.0]
```

```
In [5]: mat.append(10)
mat
```

```
Out[5]: [2.0, 5.0, 9.0, 10]
```

```
In [6]: mat.insert(3,-7)
mat
```

```
Out[6]: [2.0, 5.0, 9.0, -7, 10]
```

```
In [7]: mat = [[2.0,5.0,9.0],[2.0,5.0,9.0]]
mat
```

```
Out[7]: [[2.0, 5.0, 9.0], [2.0, 5.0, 9.0]]
```

```
In [8]: len(mat)
```

```
Out[8]: 2
```

```
In [9]: mat1 = [2.0,5.0,9.0]
mat2 = [2.2,5.5,9.9]
print("mat1 = ",mat1)
print("mat2 = ",mat2)
mat1+mat2
```

```
mat1 = [2.0, 5.0, 9.0]
mat2 = [2.2, 5.5, 9.9]
```

```
Out[9]: [2.0, 5.0, 9.0, 2.2, 5.5, 9.9]
```

```
In [10]: # membuat matrik menggunakan numpy
import numpy
from numpy import array
mat = array([2.0,5.0,9.0])
mat
```

Out[10]: array([2., 5., 9.])

```
In [11]: mat = array([[2.0,5.0,9.0],[2.0,5.0,9.0]])
mat
```

Out[11]: array([[2., 5., 9.],  
[2., 5., 9.]])

```
In [12]: mat = array([[[2.0,5.0,9.0],[2.0,5.0,9.0]],[[2.0,5.0,9.0],[2.0,5.0,9.0]]])
mat
```

Out[12]: array([[2., 5., 9.],  
[2., 5., 9.]],  
  
[[2., 5., 9.],  
[2., 5., 9.]])

```
In [13]: mat1 = array([2.0,5.0,9.0])
mat2 = array([2.2,5.5,9.9])
print("mat1 = ",mat1)
print("mat2 = ",mat2)
mat1+mat2
```

```
mat1 = [2. 5. 9.]
mat2 = [2.2 5.5 9.9]
```

Out[13]: array([ 4.2, 10.5, 18.9])

```
In [15]: # membuat elemen matrik secara random dengan tipe data float dan matrik 1 dimensi
import numpy as mat
matrikRandom1D = mat.random.rand(4)
print(matrikRandom1D)
```

```
[0.47841272 0.93451071 0.64841021 0.26931217]
```

```
In [16]: # matrik 2 dimensi
matRandom2D = mat.random.rand(4,5)
print(matRandom2D)
```

```
[0.40370347 0.32851004 0.57207392 0.3054613 0.20289032]
[0.11191833 0.97451902 0.6317121 0.81752887 0.63282708]
[0.05374773 0.29867977 0.95446813 0.94816675 0.75160531]
[0.45074695 0.26465679 0.850114 0.43683777 0.90965292]]
```

```
In [17]: # membuat elemen matrik secara random dengan tipe data integer dan matrik 1 dimensi
matRandom1D = mat.random.randint(2, size=7)
print(matRandom1D)
```

```
[0 1 1 1 0 1 1]
```

```
In [18]: # matrik 2 dimensi
matRandom2D = mat.random.randint(6, size=(3,4))
print(matRandom2D)
```

```
[2 4 1 4]
[4 2 1 3]
[4 4 1 3]]
```

```
In [20]: # matrik 3D dengan elemen random bertipe data float dan integer
matRandomFloat3D = mat.random.rand(3,3,3)
matRandomInt3D = mat.random.randint(10, size=(4,4,4))
```

```
print("matrik 3D Float = ",matRandomFloat3D)
print("matrik 3D Int = ",matRandomInt3D)
```

```
matrik 3D Float = [[0.49442613 0.61364647 0.76438794]
[0.79514644 0.78492666 0.97972304]
[0.64453688 0.7078277 0.16346233]]
```

```
[[0.92898658 0.60750369 0.06410316]
[0.76233702 0.30395203 0.20311903]
[0.93324858 0.45610095 0.36570883]]
```

```
[[0.68317171 0.3037039 0.57830033]
[0.98831018 0.84931531 0.69294638]
[0.10022324 0.10382983 0.21685393]]]
```

```
matrik 3D Int = [[0 0 2 1]
[6 4 8 0]
[9 7 1 5]
[9 9 8 4]]
```

```
[[4 0 0 2]
[8 8 7 3]
[0 7 5 9]
[4 0 9 3]]
```

```
[[0 1 4 3]
[4 8 9 1]
[1 8 0 8]
[5 2 4 7]]
```

```
[[0 3 7 3]
[6 5 8 8]
[7 8 0 4]
[8 5 6 2]]]
```

```
In [22]: # matrik nol, bujur sangkar, persegi panjang, diagonal, satuan, skalar
matNol = mat.zeros((2,2))
matPersegi = mat.random.randint(10, size=(5,5))
matPP = mat.random.randint(10, size=(2,3))
matDiagonal = mat.diag([1,2,3])
matIdentitas = mat.eye(3)
matSkalar = 4*mat.eye(5)
print("matrik nol =")
print(matNol)
print("matrik bujur sangkar =")
print(matPersegi)
print("matrik persegi panjang =")
print(matPP)
print("matrik diagonal =")
print(matDiagonal)
print("matrik satuan =")
print(matIdentitas)
print("matrik skalar =")
print(matSkalar)
```

```

matrik nol =
[[0. 0.]
 [0. 0.]]
matrik bujur sangkar =
[[9 8 1 2 5]
 [4 1 8 4 3]
 [8 6 9 4 8]
 [6 2 8 9 0]
 [2 2 8 6 0]]
matrik persegi panjang =
[[5 9 8]
 [5 5 0]]
matrik diagonal =
[[1 0 0]
 [0 2 0]
 [0 0 3]]
matrik satuan =
[[1. 0. 0.]
 [0. 1. 0.]
 [0. 0. 1.]]
matrik skalar =
[[4. 0. 0. 0. 0.]
 [0. 4. 0. 0. 0.]
 [0. 0. 4. 0. 0.]
 [0. 0. 0. 4. 0.]
 [0. 0. 0. 0. 4.]]

```

```

In [31]: # operasi aljabar pada matrik
k = 2
A = mat.array([[2,4],[3,7]])
print("k = ",k)
print("Matrik A = ")
print(A)
matPerkalianSkalar = k*A
print("k*A = ")
print(matPerkalianSkalar)

```

```

k = 2
Matrik A =
[[2 4]
 [3 7]]
k*A =
[[ 4  8]
 [ 6 14]]

```

```

In [27]: # operasi aljabar lain, penjumlahan, pengurangan, perkalian
B = mat.array([[0,1],[2,3]])
plus = A+B
minus = A-B
times = mat.dot(A,B)
print("A+B =")
print(plus)
print("A-B =")
print(minus)
print("AxB =")
print(times)

```

```

A+B =
[[ 2  5]
 [ 5 10]]
A-B =
[[2 3]
 [1 4]]
AxB =
[[ 8 14]
 [14 24]]

```

```

In [32]: # sifat2 matrik
A = mat.array([[2,4],[3,7]])
B = mat.array([[0,1],[2,3]])
C = mat.array([[5,6],[8,9]])
l = 2
print("k =",k)
print("l =",l)
print("Matrik A =")
print(A)
print("Matrik B =")
print(B)
print("Matrik C =")
print(C)
sumAB = A+B
sumBA = A+B
SM1 = mat.array_equal(sumAB,sumBA)
print("A+B=B+A?",SM1)
sumBC = B+C
sumA_sBC = A+sumBC
sumsAB_C = sumAB+C
SM2 = mat.array_equal(sumA_sBC,sumsAB_C)
print("A+(B+C)=(A+B)+C?",SM2)
timk_sAB = k*sumAB
timkA = k*A
timkB = k*B
sumtkA_tkB = timkA+timkB
SM3 = mat.array_equal(timk_sAB,sumtkA_tkB)
print("k(A+B)=kA+kB?",SM3)
sumkl = k+l
timskl_A = sumkl*A
timlA = l*A
sumtkA_tlA = timkA+timlA
SM4 = mat.array_equal(timskl_A,sumtkA_tlA)
print("(k+l)A=kA+lA?",SM4)
timkl = k*l
timtkl_A = timkl*A
timk_tlA = k*timlA
SM5 = mat.array_equal(timtkl_A,timk_tlA)
print("(kl)A=k(lA)?",SM5)
timAB = A@B
timk_tAB = k*timAB
timtkA_B = timkA@B
timA_tkB = A@timkB
SM6_1 = mat.array_equal(timk_tAB,timtkA_B)
SM6_2 = mat.array_equal(timtkA_B,timA_tkB)
SM6_3 = mat.array_equal(SM6_1,SM6_2)
print("k(AB)=kA(B)=A(kB)?",SM6_3)
timBC = B@C
timA_tBC = A@timBC
timtAB_C = timAB@C

```

```

SM7 = mat.array_equal(timA_tBC,timtAB_C)
print("A(BC)=(AB)C?",SM7)
timA_sBC = A@sumBC
timAC = A@C
sumTAB_tAC = timAB+timAC
SM8 = mat.array_equal(timA_sBC,sumTAB_tAC)
print("A(B+C)=AB+AC?",SM8)
timsAB_C = sumAB@C
sumtAC_tBC = timAC+timBC
SM9 = mat.array_equal(timsAB_C,sumtAC_tBC)
print("(A+B)C=AC+BC?",SM9)
dotAB = mat.dot(A,B)
dotBA = mat.dot(B,A)
SM10 = mat.array_equal(dotAB,dotBA)
print("AB=BA?",SM10)
A = mat.array([[0,0],[0,0]])
timAB = A@B
timAC = A@C
SM11_1 = mat.array_equal(timAB,timAC)
SM11_2 = mat.array_equal(B,C)
print("Jika AB=AC, belum tentu B=C,")
print("Matrik A =")
print(A)
print("AB=AC?",SM11_1,"", B=C?",SM11_2)
print("Jika AB=0, ada 2 kemungkinan :")
nol = mat.array([[0,0],[0,0]])
SM12_1 = mat.array_equal(timAB,nol)
print(" - A=0 dan/atau B=0", "(",SM12_1,")")
A = mat.array([[1,1],[2,2]])
B = mat.array([1,-1])
nol = mat.array([0,0])
print("Matrik A =")
print(A)
print("Matrik B =")
print(B)
timAB = mat.dot(A,B)
SM12_2 = mat.array_equal(timAB,nol)
print(" - A!=0 dan B!=0", "(",SM12_2,")")

```

```

k = 2
l = 2
Matrik A =
[[2 4]
 [3 7]]
Matrik B =
[[0 1]
 [2 3]]
Matrik C =
[[5 6]
 [8 9]]
A+B=B+A? True
A+(B+C)=(A+B)+C? True
k(A+B)=kA+kB? True
(k+1)A=kA+lA? True
(k1)A=k(1A)? True
k(AB)=kA(B)=A(kB? True
A(BC)=(AB)C? True
A(B+C)=AB+AC? True
(A+B)C=AC+BC? True
AB=BA? False
Jika AB=AC, belum tentu B=C,
Matrik A =
[[0 0]
 [0 0]]
AB=AC? True , B=C? False
Jika AB=0, ada 2 kemungkinan :
- A=0 dan/atau B=0 ( True )
Matrik A =
[[1 1]
 [2 2]]
Matrik B =
[ 1 -1]
- A!=0 dan B!=0 ( True )

```

In [ ]: