Mathematics 3
Scalar and Vector

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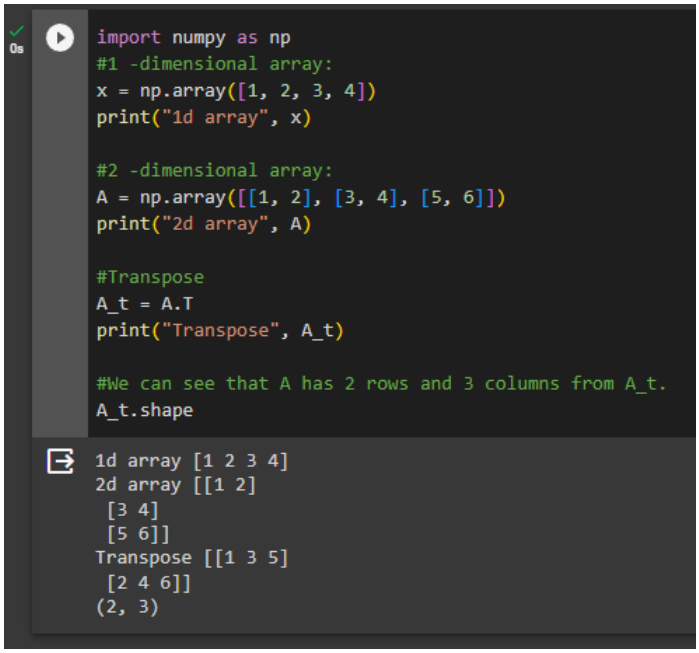
Exercise 1

1. Scalar
2. Vector
3. Scalar
4. Scalar

Exercise 2



```
import numpy as np
#1 -dimensional array:
x = np.array([1, 2, 3, 4])
print("1d array", x)

#2 -dimensional array:
A = np.array([[1, 2], [3, 4], [5, 6]])
print("2d array", A)

#Transpose
A_t = A.T
print("Transpose", A_t)

#We can see that A has 2 rows and 3 columns from A_t.
A_t.shape
```

```
1d array [1 2 3 4]
2d array [[1 2]
 [3 4]
 [5 6]]
Transpose [[1 3 5]
 [2 4 6]]
(2, 3)
```

x is the equivalent of a Vector and A is the equivalent of a Matrix. A_t variable is a transposed A variable. the A_t.shape shows what the ordo of the Matrix A after getting transposed.

Exercise 3

```
import numpy as np

vector_row = np.array([1, 2, 3])

vector_column = np.array([[1], [2], [3]])

print(vector_row)
print(vector_column)
```

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

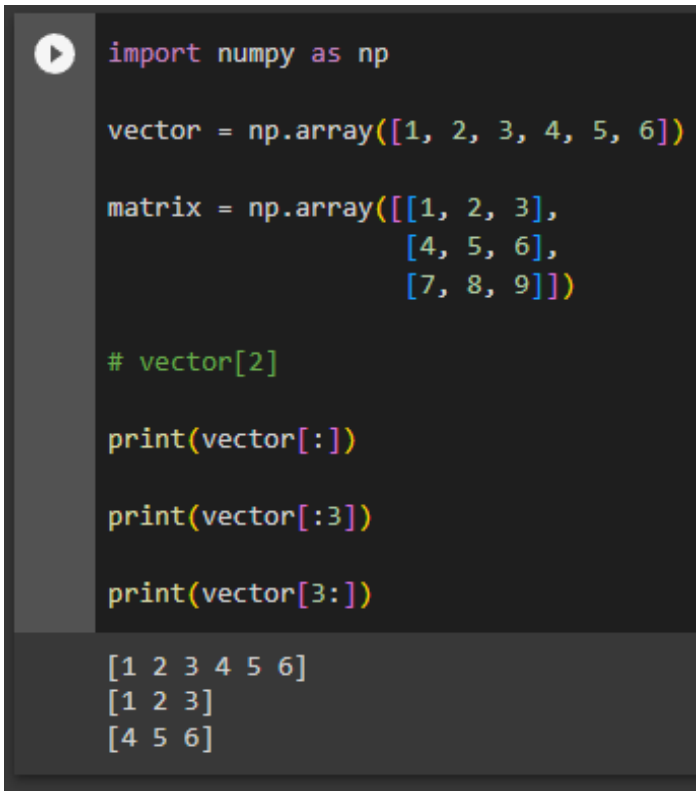
the row vector is just a standart array. the column vector is technically a 2D array with only 1 column and thus creating a vector that's presented in a column.

Exercise 4

```
import numpy as np

vector = np.array([1, 2, 3, 4, 5, 6])

matrix = np.array([[1, 2, 3],
                   [4, 5, 6],
                   [7, 8, 9]])

vector[2]
```

```
3
```

the vector[2] select the 3 element of the vector.



```
import numpy as np

vector = np.array([1, 2, 3, 4, 5, 6])

matrix = np.array([[1, 2, 3],
                   [4, 5, 6],
                   [7, 8, 9]])

# vector[2]

print(vector[:])

print(vector[:3])

print(vector[3:])
```

```
[1 2 3 4 5 6]
[1 2 3]
[4 5 6]
```

the vector[:] select all element, vector[:3] select first 3 element, vector[3:] select every element past the 3rd element.

Exercise 5

There are many operation we can do with vector and matrix and n-dimensional array

Exercise 6

Vectors are used in listing things and matrixes are used in making tables