

```
In [1]: import numpy as np

np.random.seed(21)
random_integers = np.random.randint(1, high=500000, size=(20, 5))

second_column = random_integers[:, 1]
average_second_column = np.mean(second_column)
print(f"Average value of the second column: {average_second_column:.2f}")

third_and_fourth_columns_first_five_rows = random_integers[:5, 2:4]
average_third_and_fourth_columns_first_five_rows = np.mean(third_and_fourth_columns_first_five_rows)
print(f"Average value of the first 5 rows of the third and fourth columns: {average_third_and_fourth_columns_first_five_rows:.2f}")

Average value of the second column: 214895.80
Average value of the first 5 rows of the third and fourth columns: 286058.50
```

```
In [4]: import numpy as np
first_matrix = np.array([[1, 2, 3], [4, 5, 6]])
print(first_matrix)
second_matrix = np.array([1, 2, 3])
print(second_matrix)
my_vector = np.array([1, 2, 3, 4, 5, 6])
selection = my_vector % 2 == 0
my_vector[selection]
```

```
[[1 2 3]
 [4 5 6]]
[1 2 3]
Out[4]: array([2, 4, 6])
```

```
In [6]: my_array = np.array([[1, 2, 3], [4, 5, 6]])
print(my_array)
my_slice = my_array[:, 1:3]
print(my_slice)
my_array = my_array * 2
print(my_array)
print(my_slice)
```

```
[[1 2 3]
 [4 5 6]]
[[2 3]
 [5 6]]
[[ 2  4  6]
 [ 8 10 12]]
[[2 3]
 [5 6]]
```

```
In [10]: my_array = np.array([[1, 2, 3], [4, 5, 6]])
print(my_array)
my_slice = my_array[:, 1:3].copy()
print(my_slice)
my_array[:, :] = my_array * 2
print(my_array)
print(my_slice)
```

```
[[1 2 3]
 [4 5 6]]
[[2 3]
 [5 6]]
[[ 2  4  6]
 [ 8 10 12]]
[[2 3]
 [5 6]]
```

```
In [11]: arr = np.array([0, 1, 2, 3, 4, 5, 6, 7, 8, 9])
selection = arr % 2 == 0
arr[selection]
```

```
Out[11]: array([0, 2, 4, 6, 8])
```

```
In [15]: x = np.array([5,6,7,8,3,4])
y = np.array([5,3,4,5,2,4])
arr[np.where(x==y)]
```

```
Out[15]: array([0, 5])
```

```
In [17]: k = np.array([5, 3, 4, 5, 2, 4])

k_min = np.min(k)
k_max = np.max(k)
print((k - k_min) / (k_max - k_min))
```

```
[1.          0.33333333 0.66666667 1.          0.          0.66666667]
```

```
In [19]: import numpy as np
from scipy.stats import rankdata
p = np.array([15, 10, 3, 2, 5, 6, 4])
ranks = rankdata(p, method='average')
percentiles = (ranks - 1) / (len(p) - 1) * 100
print(percentiles)
```

```
[100.          83.33333333 16.66666667  0.          50.
 66.66666667  33.33333333]
```

```
In [21]: p = np.array([5, 10, np.nan, 3, 2, 5, 6, np.nan])
missing = np.sum(np.isnan(p))
print(missing)
```

```
2
```

```
In [24]: import numpy
my_array = numpy.array([ [1, 2], [3, 4] ])
print (numpy.sum(my_array, axis = 0))
print (numpy.sum(my_array, axis = 1))
print (numpy.sum(my_array, axis = None))
print (numpy.sum(my_array))
```

```
[4 6]
[3 7]
10
10
```

```
In [25]: my_array = numpy.array([ [1, 2], [3, 4] ])
print (numpy.prod(my_array, axis = 0))
print (numpy.prod(my_array, axis = 1))
print (numpy.prod(my_array, axis = None))
print (numpy.prod(my_array))
```

```
[3 8]
[ 2 12]
24
24
```

```
In [27]: my_array = numpy.array([[2, 5],
[3, 7],
[1, 3],
[4, 0]])
```

```
print (numpy.min(my_array, axis = 0))#column
print (numpy.min(my_array, axis = 1))#row
print (numpy.min(my_array, axis = None))
print (numpy.min(my_array))
```

```
[1 0]
[2 3 1 0]
0
0
```

```
In [28]: my_array = numpy.array([[2, 5],
    [3, 7],
    [1, 3],
    [4, 0]])
print (numpy.max(my_array, axis = 0))
print (numpy.max(my_array, axis = 1))
print (numpy.max(my_array, axis = None))
print (numpy.max(my_array))
```

```
[4 7]
[5 7 3 4]
7
7
```

```
In [29]: change_array = numpy.array([1,2,3,4,5,6])
change_array.shape = (3, 2)
print (change_array)
```

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

```
In [31]: my_array = numpy.array([1,2,3,4,5,6])
print (numpy.reshape(my_array,(3,2)))
```

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

```
In [ ]:
```