Overview

About ..

- Python, Numpy, Pandas, Matplotlib
- Install
- With a blank page
- Different exercises
- Final projects

Overview

Why..

- Easy to learn
- Easy to read
- Dynamic structure
- Large libraries
- Suitable

Overview

Why..

- Large and effective
- Find answers
- Easy to read
- Flexible
- Very popular

Variables

How..

Reserved memory

Need to store

No declaring command

Variables

How..

```
S = 'Python'
```

Variables

Rules..

X and Y

Age, Carname, Total_Volume

Variables

Rules..

- Letter or « _ »
- Cannot start with number
- Only alpha-numeric and « _ »
- Case sensitive (age, Age, AGE)
- Not defined in Python (for, while, elif, if ...)

Data Types

What is..

Age → Numeric

Address → Alpha-numeric

Data Types

What is..

- Numbers
- Strings
- Lists
- Tuples
- Dictionaries

Data Types

How..

type("Variable Name")

Numbers

What is..

Integer

Positive or negative
No decimal point

Float

Positive or negative
With decimal point

Complex

A+BJ
A = Real Part
BJ = Imaginary Part

Strings

What is..

Sequence of characters, literal constant

Text

Strings

How..

'Python'
&
"Python"

Data Types

Print..

Built-in functions

Displays arguments

Data Types

Conversion..

Very important

Type name as a function

Return a new object

Data Types

Conversion..

- float
- int
- str

Operators

What is..

Manipulating

Operators

How..

4 + 5

Operators

How..

- Arithmetic Operators
- Comparison Operators
- Assignment Operators
- Logical Operators

Arithmetic Operators

What is..

+	• Addition
-	• Subtraction
*	• Multiplication
/	• Division
%	• Modulus
**	• Exponentiation
//	• Floor Division

Boolean

What is..

TRUE

FALSE

Comparison Operators

What is..

==	• Equals
!=	• Not Equal
<	• Less Than
>	• Greater Than
<=	• Less Than Equal
=>	• Greater Than Equal

Assignment Operators

What is..

A = 9

Logical Operators

What is..

and

or

not

Conditionals

What is..

Specifying actions according to the conditions

Conditionals

How..

True or False

Determine actions and statements

Non-Zero, Non-Null = True

Zero, Null = False

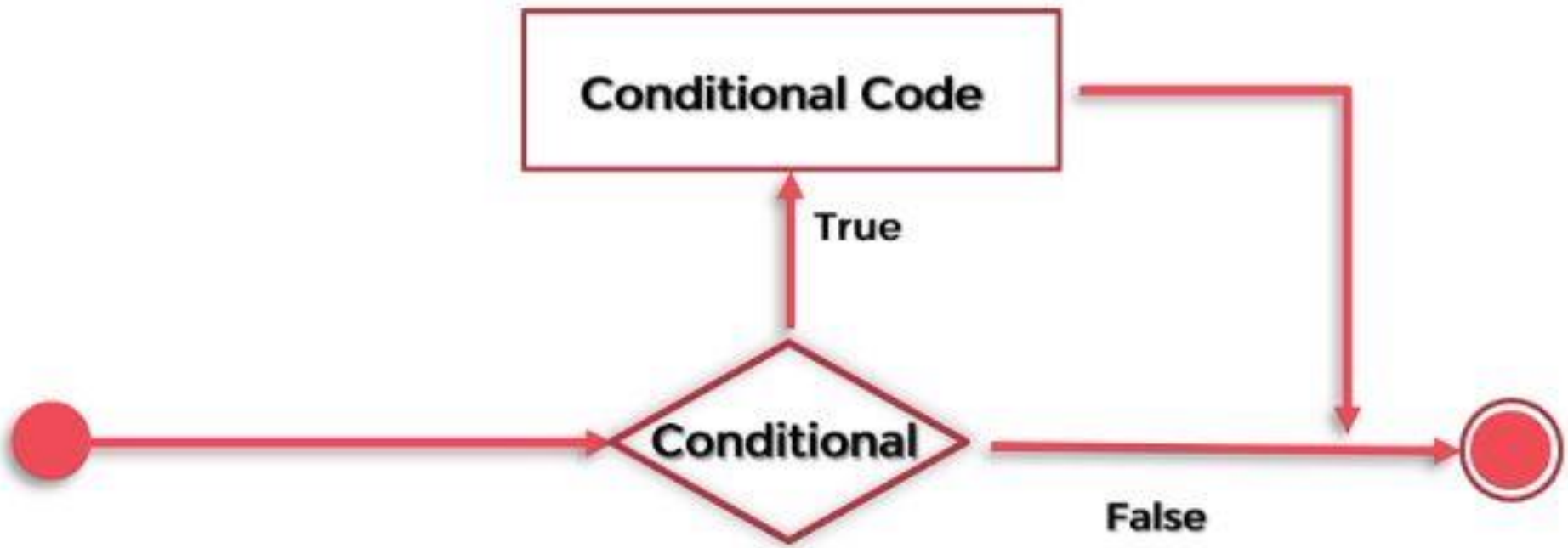
IF Statements

What is..

Based on the result of the comparison

IF Statements

How..



Else Statements

What is..

Combined with if statement

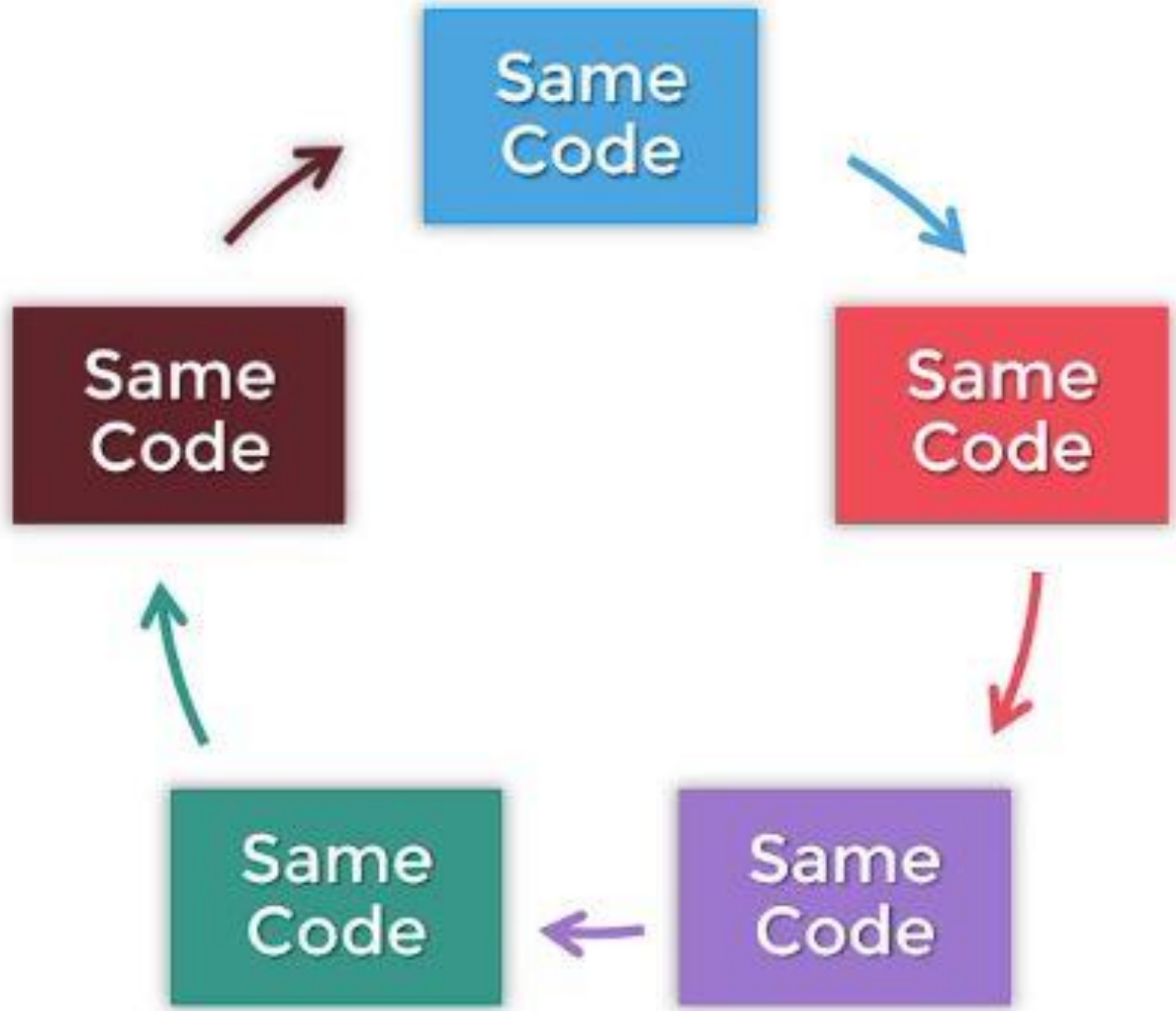
Elif Statements

What is..

- Multiple expressions for True
- Optional
- Arbitary number

Loops

What is..



Loops

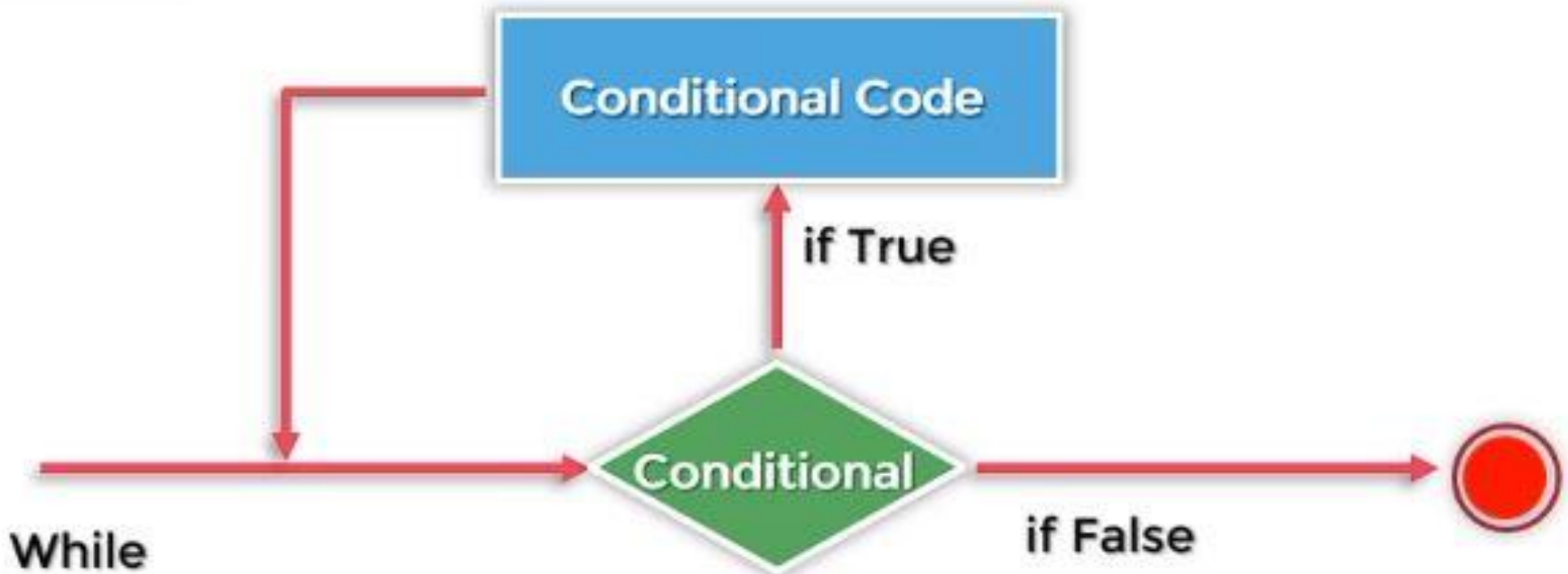
What is..

While

For

Loops

What is..



Loops

Pass..

Not want to execute any command or code

Nothing happens

Placeholder

Loops

What is..

Pre-defined function

Starting, ending, incrementing

Certain range

Sequences

What is..

Basic data structure

Index

0,1,2,3...

Six built in types

Sequences

Types

- Lists
- Tuples
- Dicts
- Sets

Sequences

Types

Do with all sequences

Indexing, slicing, adding ...

Length, largest, smallest

Operations

Lists

How..

- Most versatile
- Comma-separated, square brackets
- [,]
- Homogeneous data

Numpy

What is..

- Math library
- Numpy Arrays
- Scientific computing

Numpy

Features..

- Sophisticated functions
- C/C++ and Fortran
- Linear algebra, fourier transform, random number
- N-dimensional array

Numpy

What is..

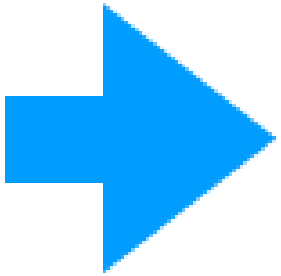
- Homogeneous Multidimensional Array
- Faster than lists
- Speed is important
- Nested loops or list comprehensions
- Array-oriented programming

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

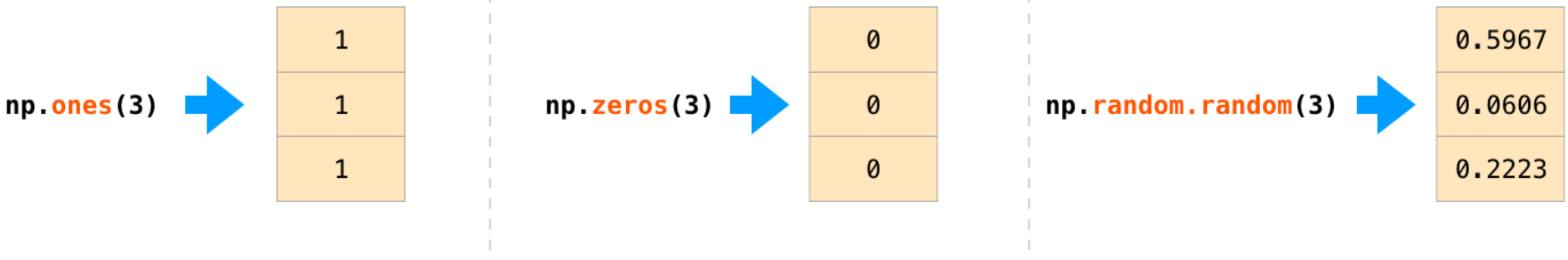
Command

NumPy Array

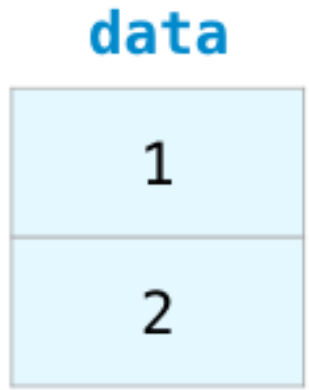
```
np.array([1,2,3])
```



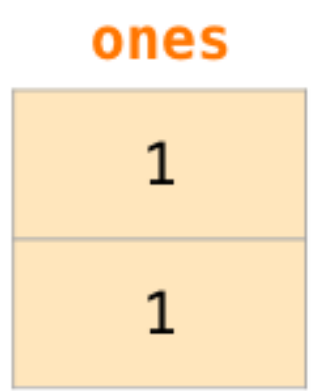
1
2
3

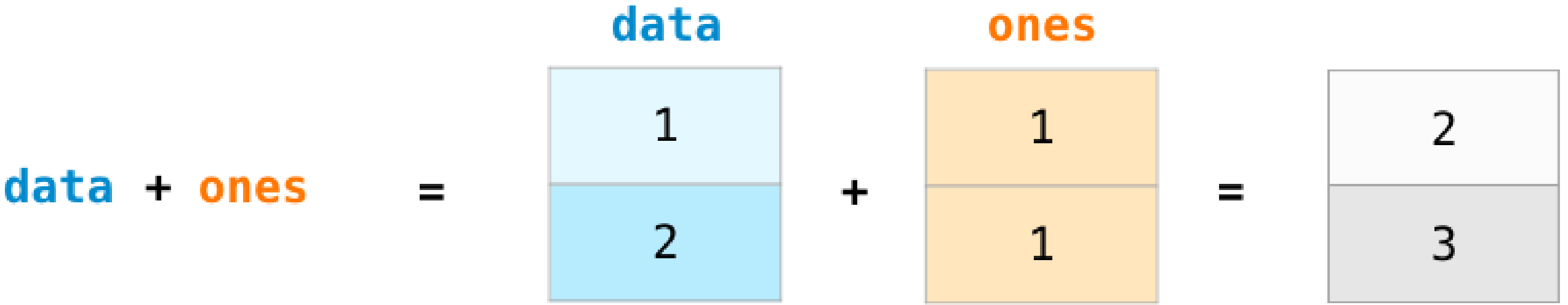

np.ones(3)
1
1
1
np.zeros(3)
0
0
0
np.random.random(3)
0.5967
0.0606
0.2223

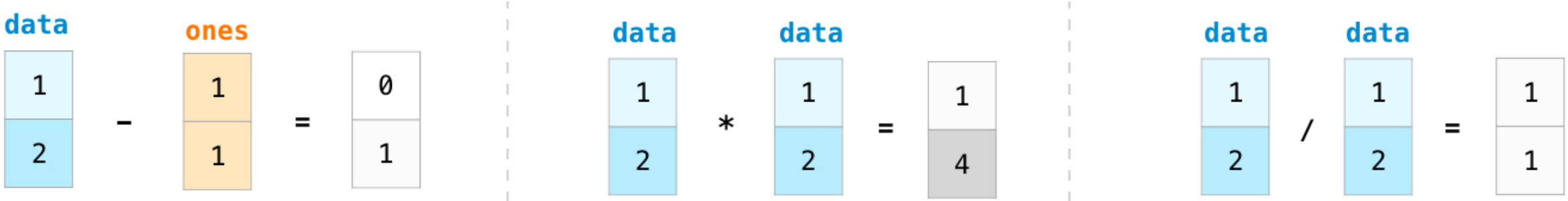
```
data = np.array([1,2])
```

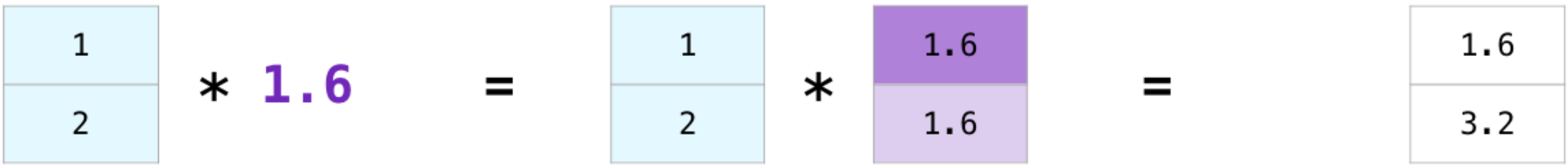


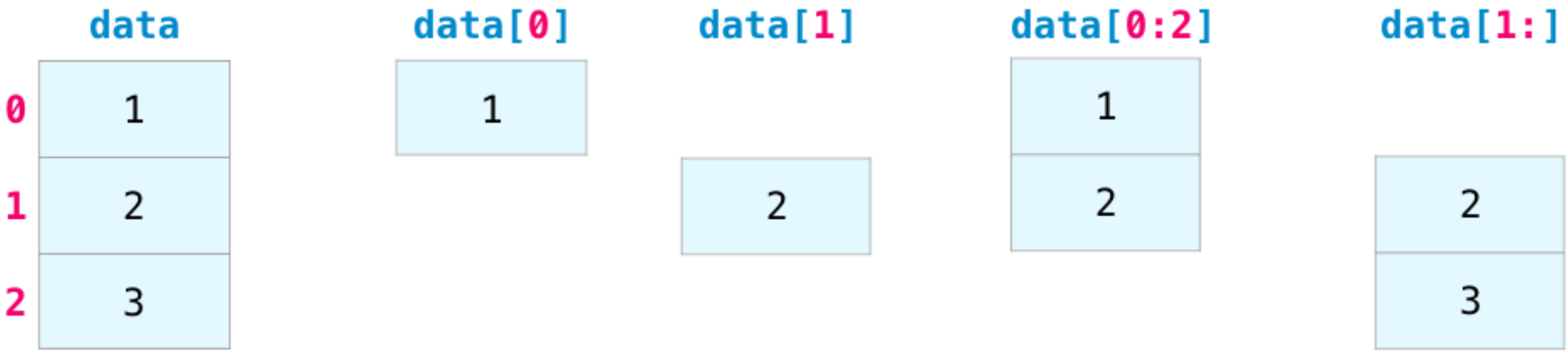

```
ones = np.ones(2)
```

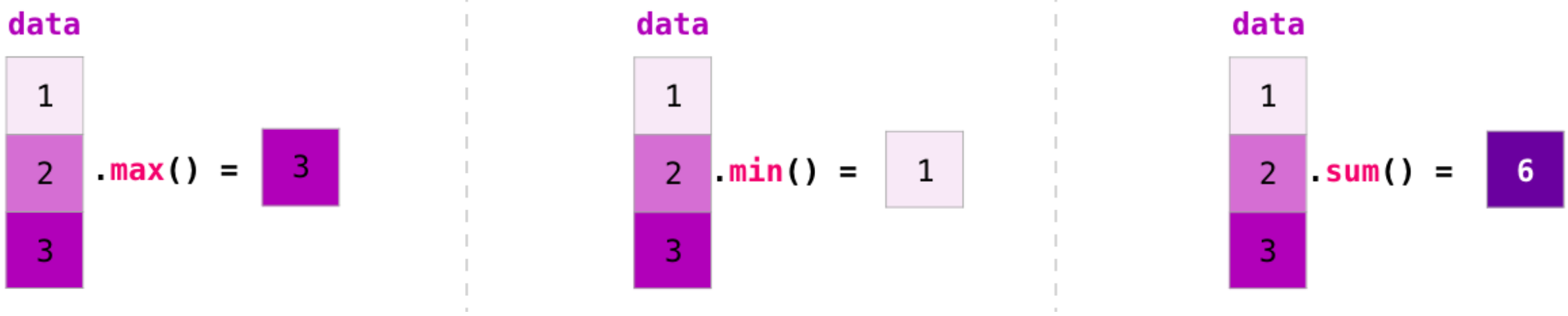



data
ones
data + ones
=
1
2
+
1
1
=
2
3

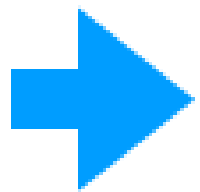

data
ones
1
2
-
1
1
=
0
1
data
data
1
2
*
1
2
=
1
4
data
data
1
2
/
1
2
=
1
1


1
2
* 1.6
=
1
2
*
1.6
1.6
=
1.6
3.2

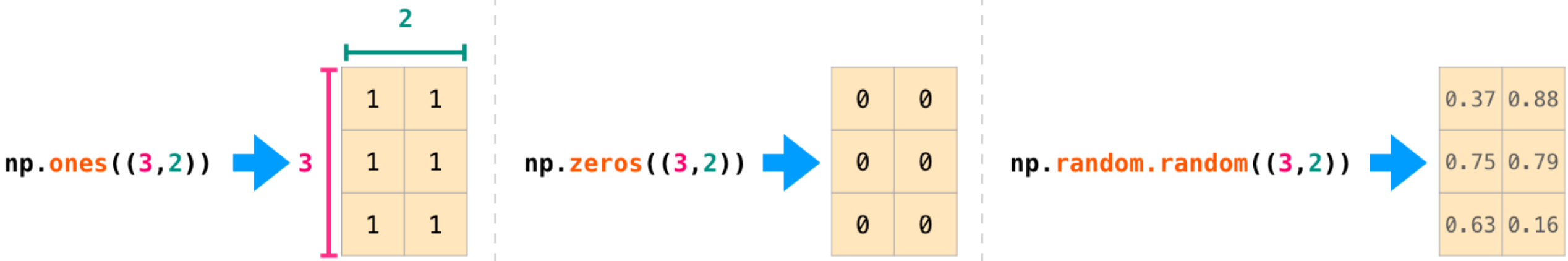

data
0
1
2
1
2
3
data[0]
1
data[1]
2
data[0:2]
1
2
data[1:]
2
3

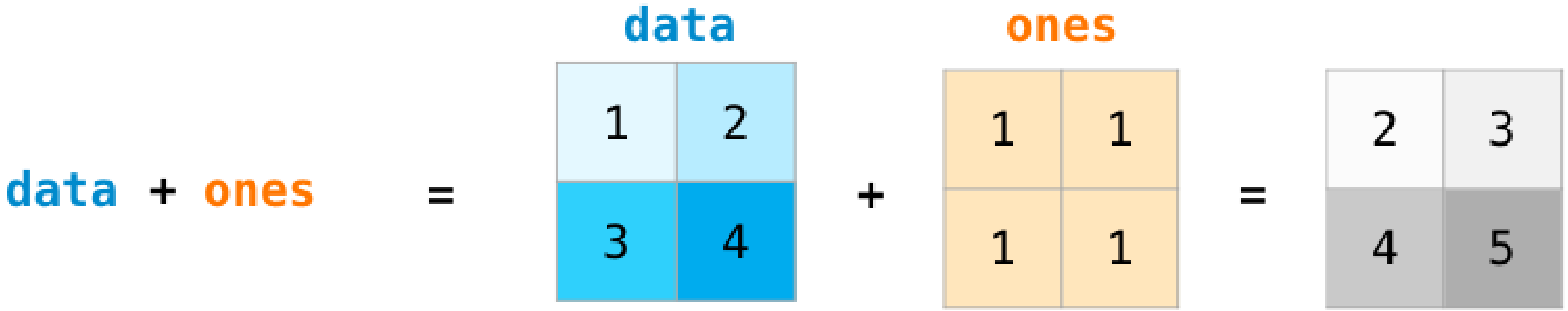

data
1
2
3
.max() =
3
data
1
2
3
.min() =
1
data
1
2
3
.sum() =
6

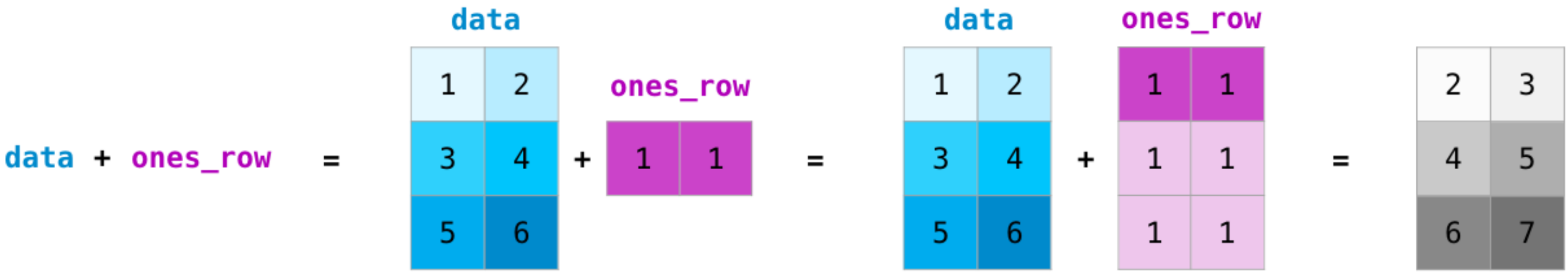
```
np.array([[1,2],[3,4]])
```

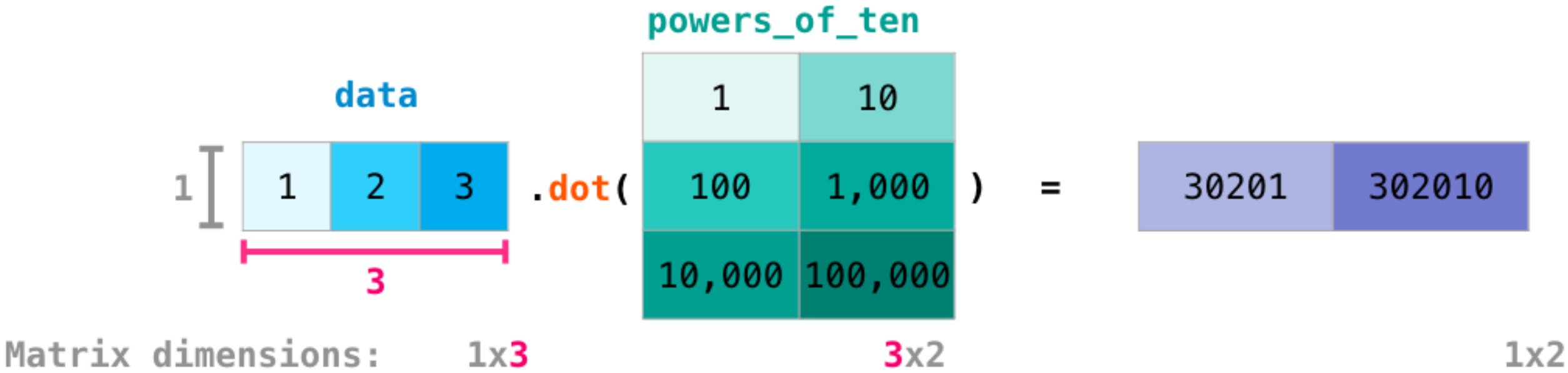


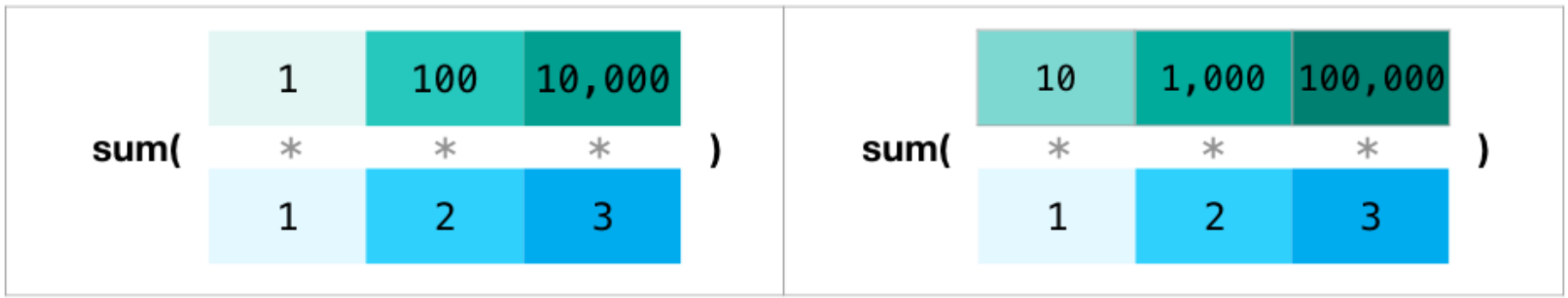
1	2
3	4


np.ones((3,2))
2
3
1 1
1 1
1 1
np.zeros((3,2))
0 0
0 0
0 0
np.random.random((3,2))
0.37 0.88
0.75 0.79
0.63 0.16


data + ones
=
data
1
2
3
4
+
ones
1
1
1
1
=
2
3
4
5

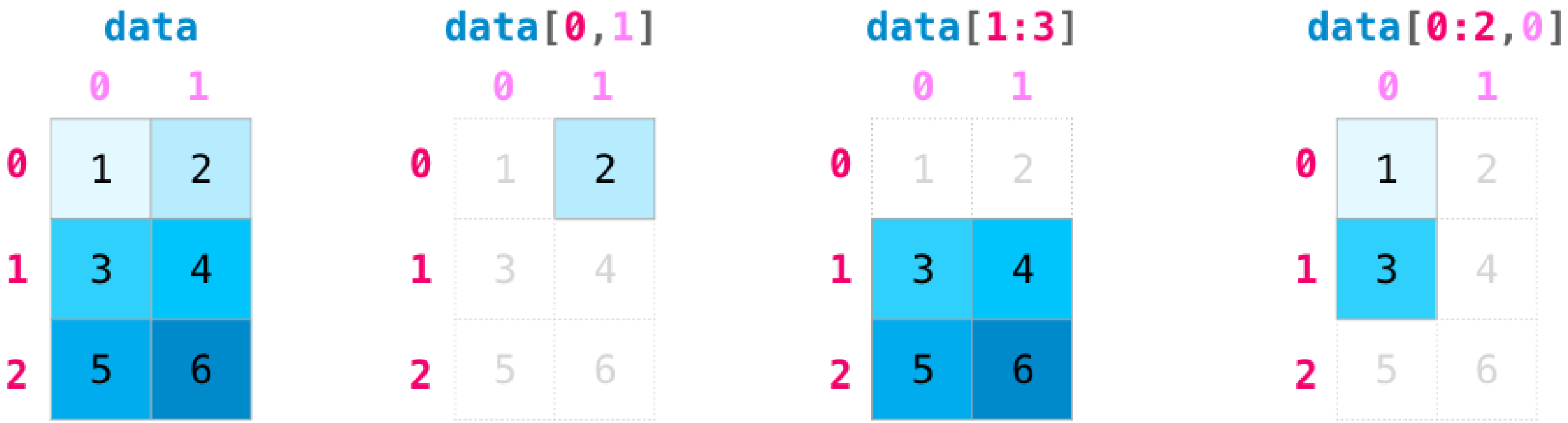

data + ones_row =
data
1 2
3 4
5 6
+
ones_row
1 1
=
data
1 2
3 4
5 6
+
ones_row
1 1
1 1
1 1
=
2 3
4 5
6 7

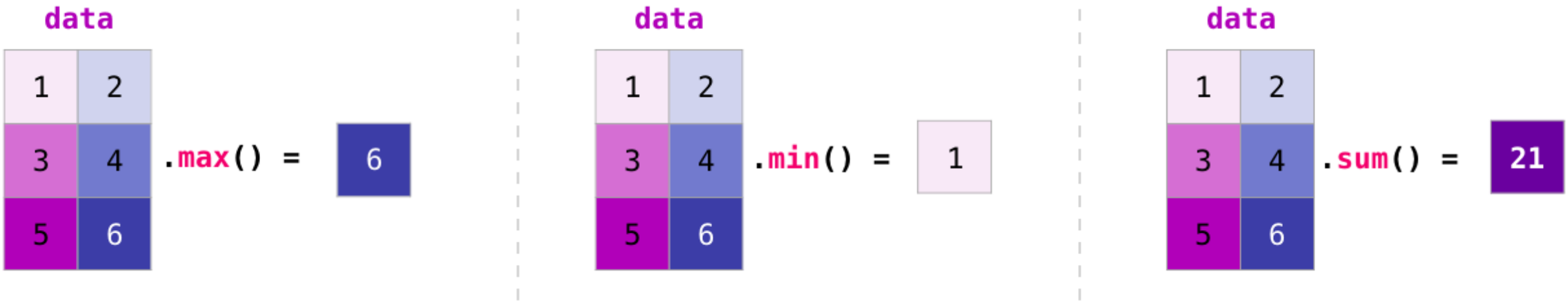

powers_of_ten
data
1
1
2
3
3
.dot(
1
10
100
1,000
10,000
100,000
)
=
30201
302010
Matrix dimensions:
1x3
3x2
1x2

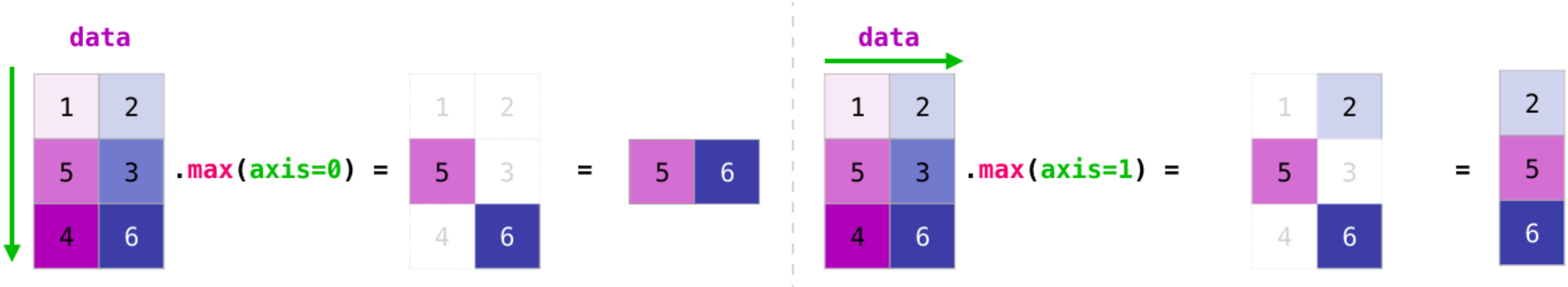


1x2

1*1 + 2*100 + 3*10,000	1*10 + 2*1,000 + 3*100,000	=	30201	302010


data
0 1
0 1 2
1 3 4
2 5 6
data[0,1]
0 1
0 1 2
1 3 4
2 5 6
data[1:3]
0 1
0 1 2
1 3 4
2 5 6
data[0:2,0]
0 1
0 1 2
1 3 4
2 5 6


data
1
2
3
4
5
6
.max() =
6
data
1
2
3
4
5
6
.min() =
1
data
1
2
3
4
5
6
.sum() =
21

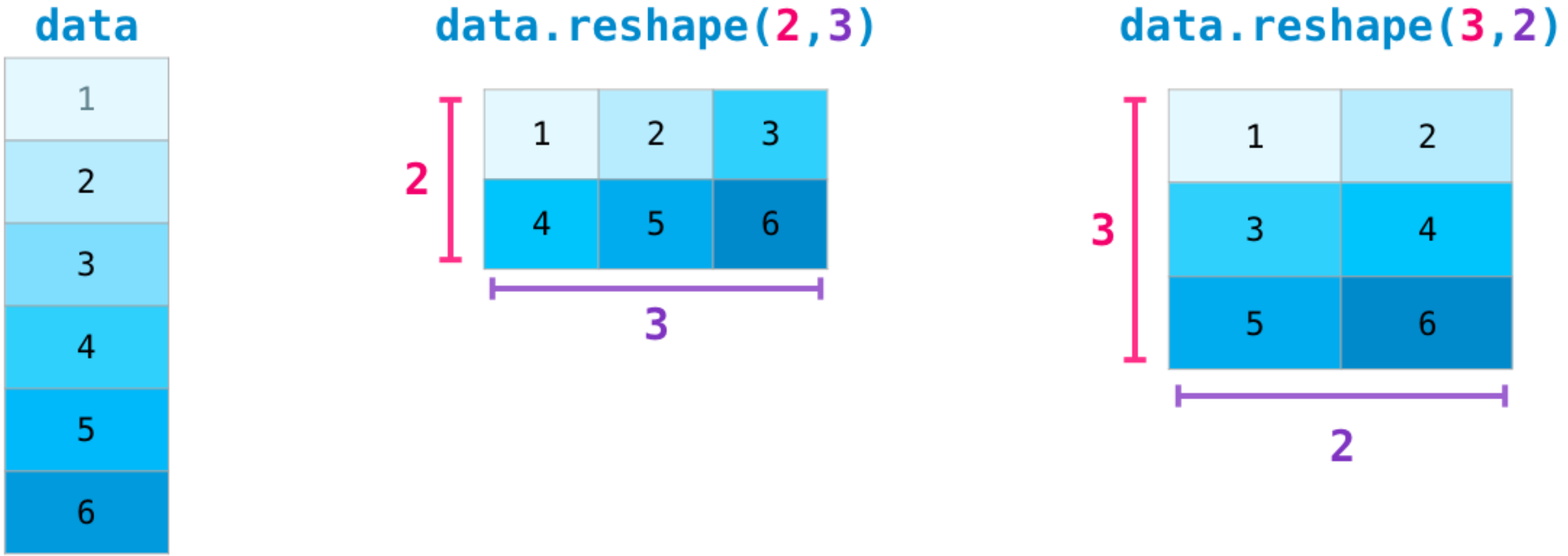

data
1 2
5 3
4 6
.max(axis=0) =
1 2
5 3
4 6
=
5 6
data
1 2
5 3
4 6
.max(axis=1) =
1 2
5 3
4 6
=
2
5
6

`data`

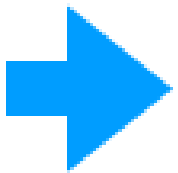
1	2
3	4
5	6

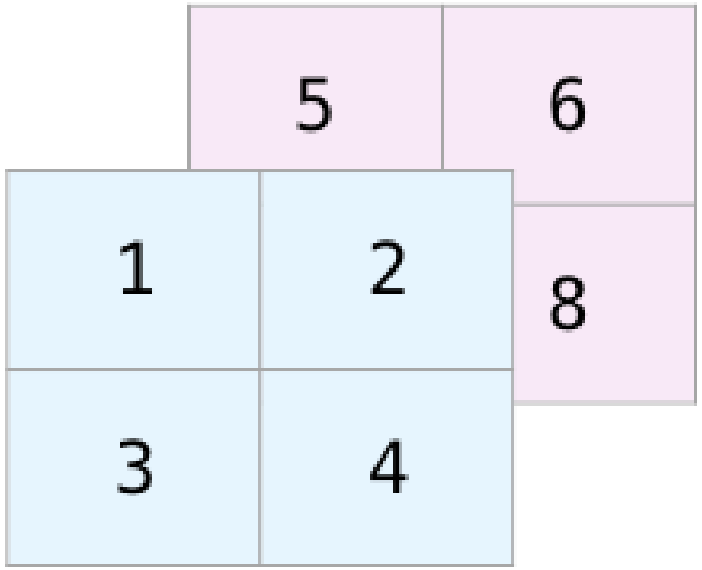
`data.T`

1	3	5
2	4	6

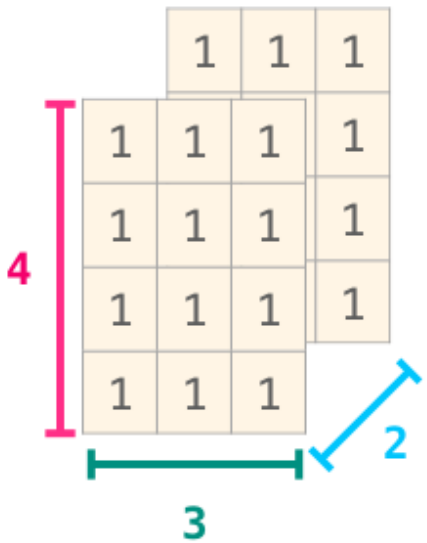

data
1
2
3
4
5
6
data.reshape(2,3)
2
1
2
3
4
5
6
3
data.reshape(3,2)
3
1
2
3
4
5
6
2

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

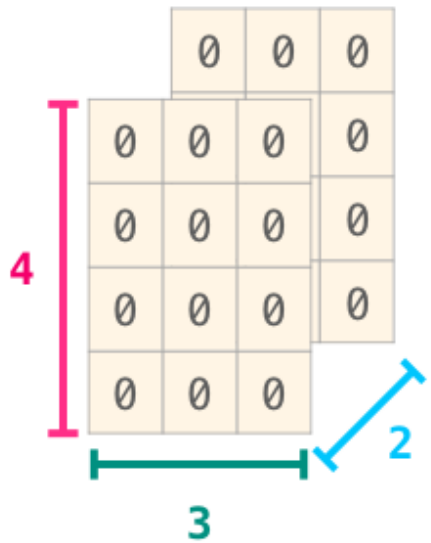




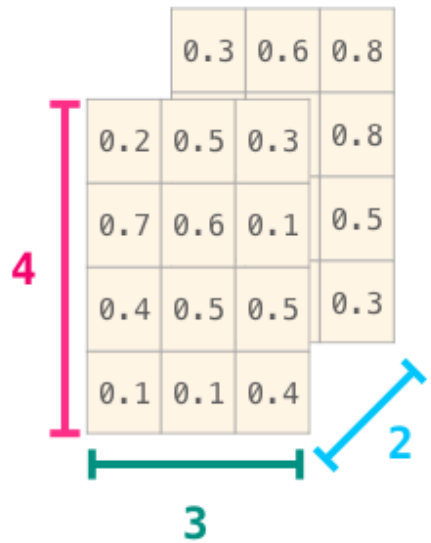
`np.ones((4,3,2))`



`np.zeros((4,3,2))`



`np.random.random((4,3,2))`



Tuples

How..

Similar to list

Immutable

Config file

a, b, c,

(a, b, c)

Dictionaries

What is..

- Real life dictionaries
- Different than the others
- Key - Value

Dictionaries

What is..

DECREASE

Make or become smaller or fewer in size, amount, intensity, or degree

Dictionaries

How..

{Key : Value}

Sets

What is..

Maths	Python
• Intersection • Join • Difference	• Intersection • Join • Difference

Modules

What are..

- Python code file
- Functions, classes, variables
- Runnable code

Modules

Why..

Reuse, more effectively

Avoid to type the same code again

Functions

More..

- Repeatedly
- print()
- In one step
- Runs when it called
- Built-in / user defined

Functions

Why..

Returns a value

Keep the value

Functions

What is..

Anonymous function

lambda

Functions

Difference..

- One line
- Short function
- Multiple arguments, one expression
- Nested function