Deep Learning Với Keras

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Bí quyết làm chủ Numpy trong Python

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FB: https://www.facebook.com/anh211

Youtube: https://www.youtube.com/watch?v=IfcHmYpeKls&list=PLXdfILWjpb1VFXSzucqbVgsCCHWwDSnei&index=6

Bài 6

Phần 1

- Creating Array
- Initial Placeholder

Phần 2

IO

- Saving & Loading on Disk
- Saving & Loading text files
- Numpy Data Types

https://www.youtube.com/watch?v=IfcHmYpeKls&list=PLXdfILWjpb1VFXSzucqbVgsCCHWwDSnei&index=7

https://www.youtube.com/watch?v=2BeThzRNyvI&list=PLXdfILWjpb1VFXSzucqbVgsCCHWwDSnei

Bài 6

Phần 3

- Inspecting Your Array
- Array Mathematics
    - Arithmetic Operations

https://www.youtube.com/watch?v=DQ5fc9-HE4M&index=8&list=PLXdfILWjpb1VFXSzucqbVgsCCHWwDSnei

Phần 4

- Array Comparison
- Aggregate Functions
- Copying Arrays
- Sorting Arrays
- Subsetting, Slicing, Indexing

https://www.youtube.com/watch?v=_xTIJjV4eSI&list=PLXdfILWjpb1VFXSzucqbVgsCCHWwDSnei&index=9

Bài 6

Phần 5

- Array Manipulation
    - Transposing Array
    - Changing Array Shape
    - Adding/Removing Elements
    - Combining Arrays
    - Splitting Arrays

https://www.youtube.com/watch?v=RAUMxftMrrc&index=10&list=PLXdfILWjpb1VFXSzucqbVgsCCHWwDSnei

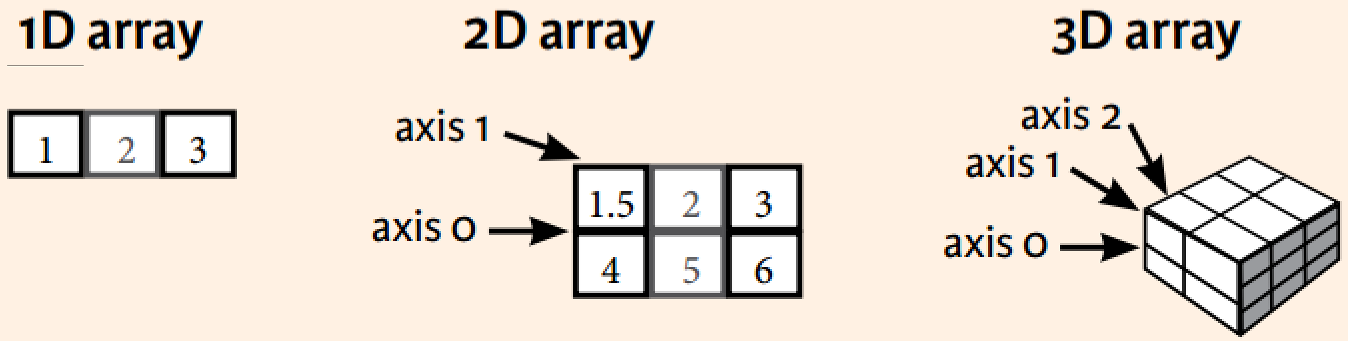
NumPy

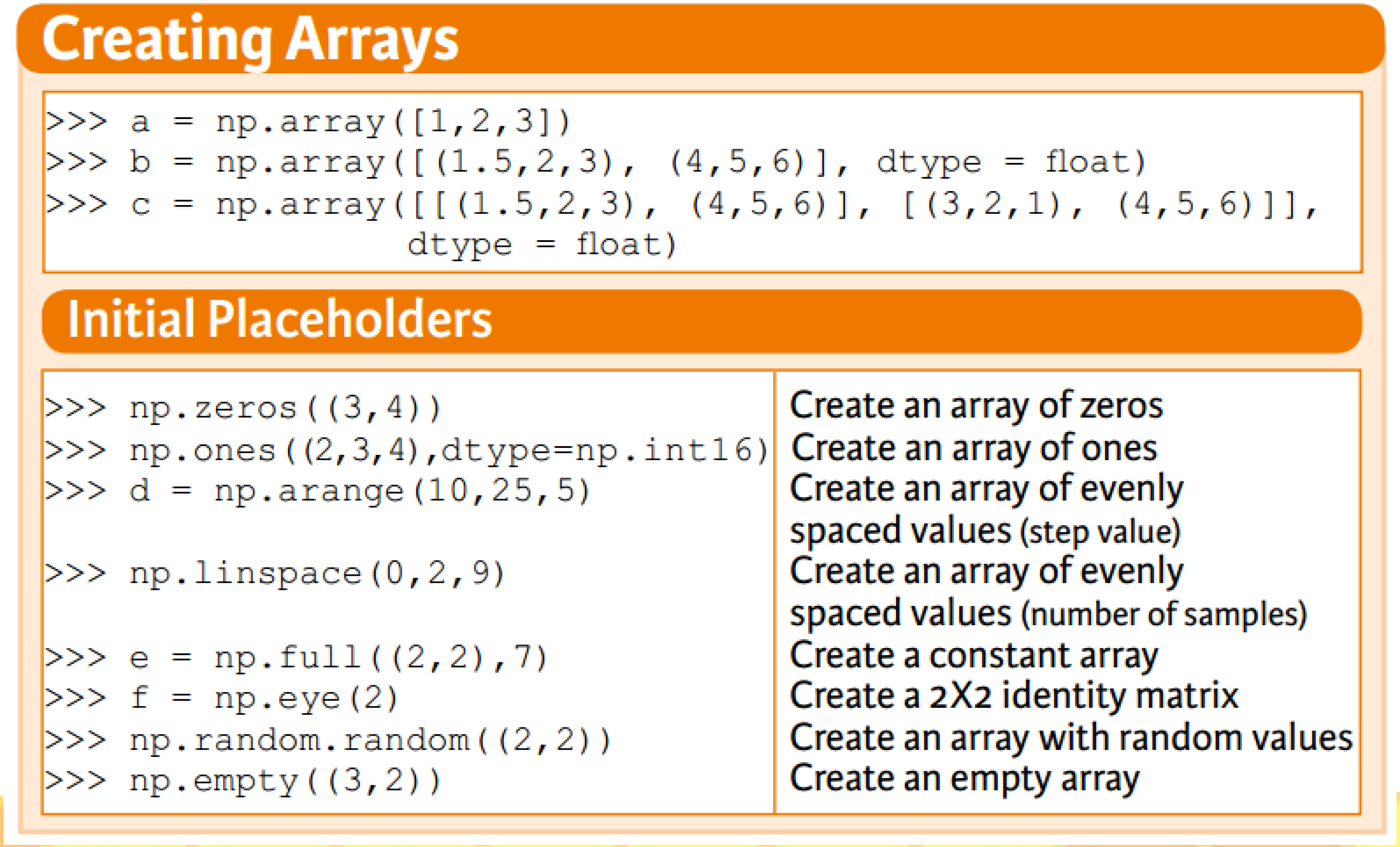
The **NumPy** library is the core library for scientific computing in Python. It provides a high-performance multidimensional array object, and tools for working with these arrays.

Use the following import convention:

```
>>> import numpy as np
```

NumPy Arrays



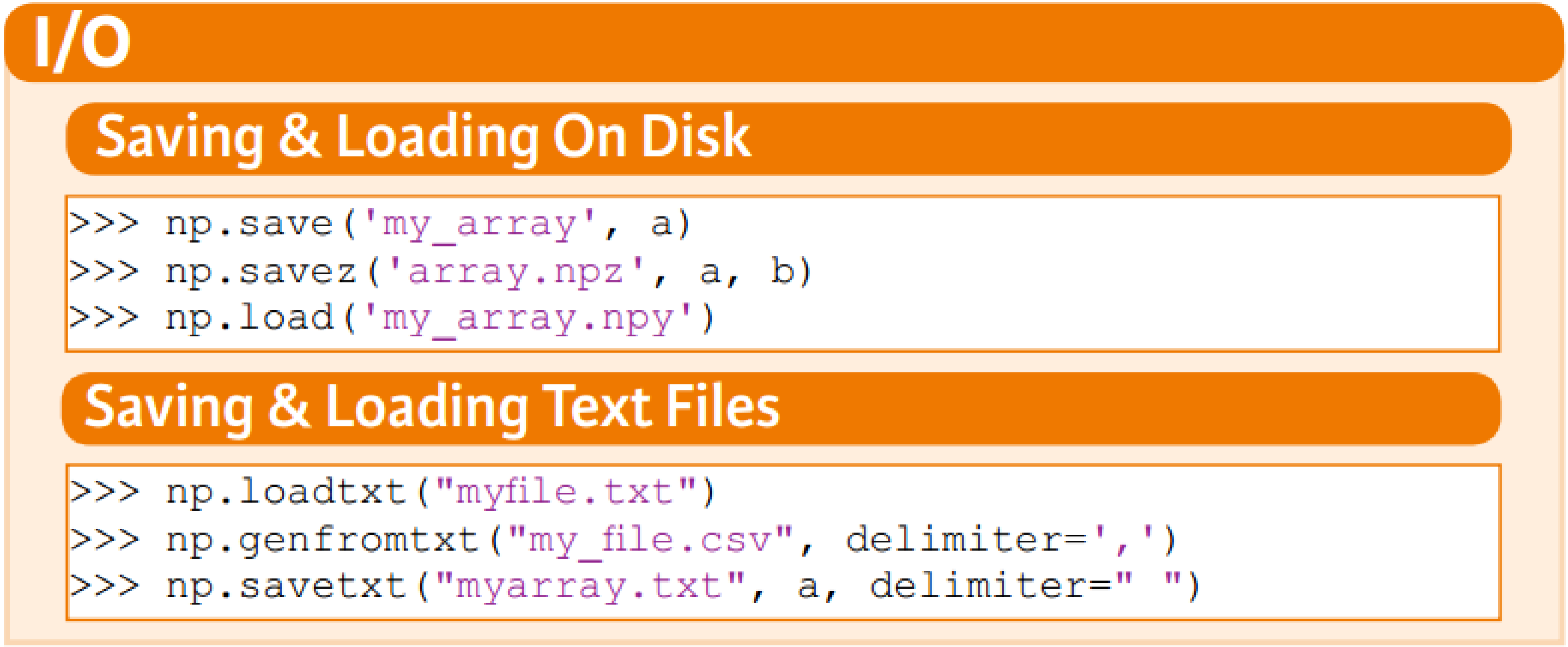


Creating Arrays

```
>>> a = np.array([1,2,3])
>>> b = np.array([(1.5,2,3), (4,5,6)], dtype = float)
>>> c = np.array([[(1.5,2,3), (4,5,6)], [(3,2,1), (4,5,6)]],
                 dtype = float)
```

Initial Placeholders

`>>> np.zeros((3,4))`	Create an array of zeros
`>>> np.ones((2,3,4),dtype=np.int16)`	Create an array of ones
`>>> d = np.arange(10,25,5)`	Create an array of evenly spaced values (step value)
`>>> np.linspace(0,2,9)`	Create an array of evenly spaced values (number of samples)
`>>> e = np.full((2,2),7)`	Create a constant array
`>>> f = np.eye(2)`	Create a 2X2 identity matrix
`>>> np.random.random((2,2))`	Create an array with random values
`>>> np.empty((3,2))`	Create an empty array



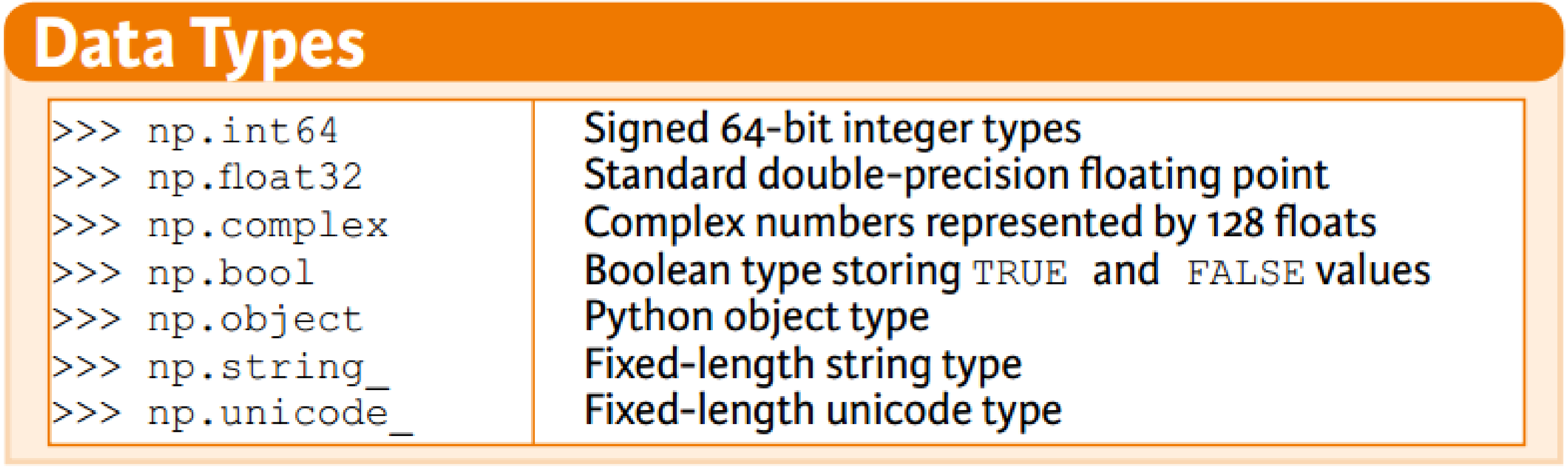
I/O

Saving & Loading On Disk

```
>>> np.save('my_array', a)
>>> np.savez('array.npz', a, b)
>>> np.load('my_array.npy')
```

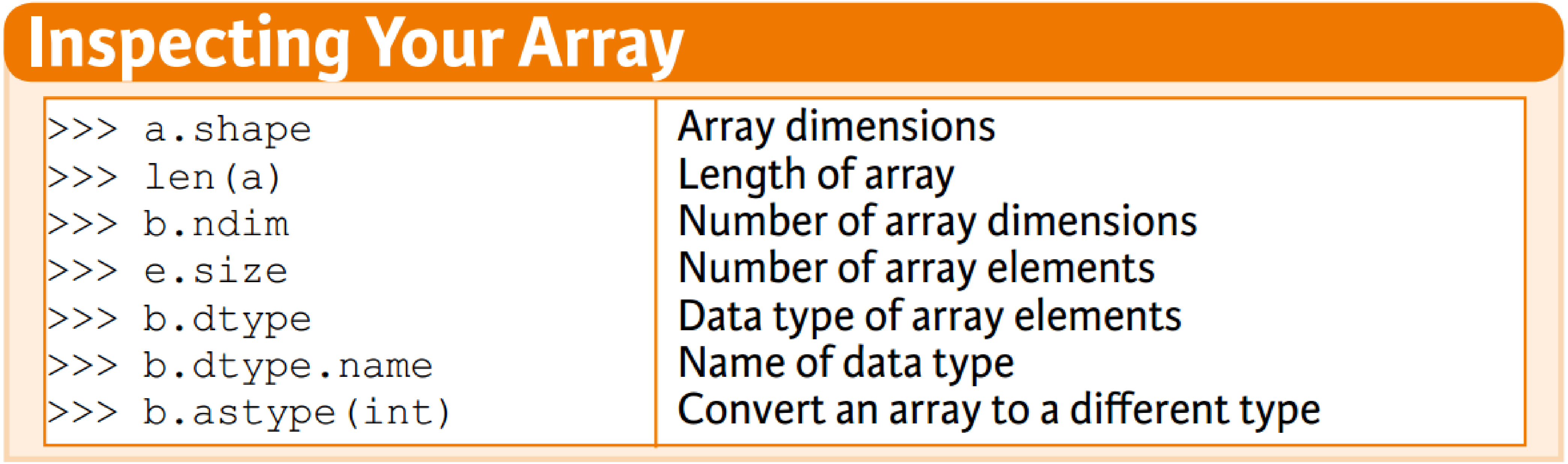
Saving & Loading Text Files

```
>>> np.loadtxt("myfile.txt")
>>> np.genfromtxt("my_file.csv", delimiter=',')
>>> np.savetxt("myarray.txt", a, delimiter=" ")
```



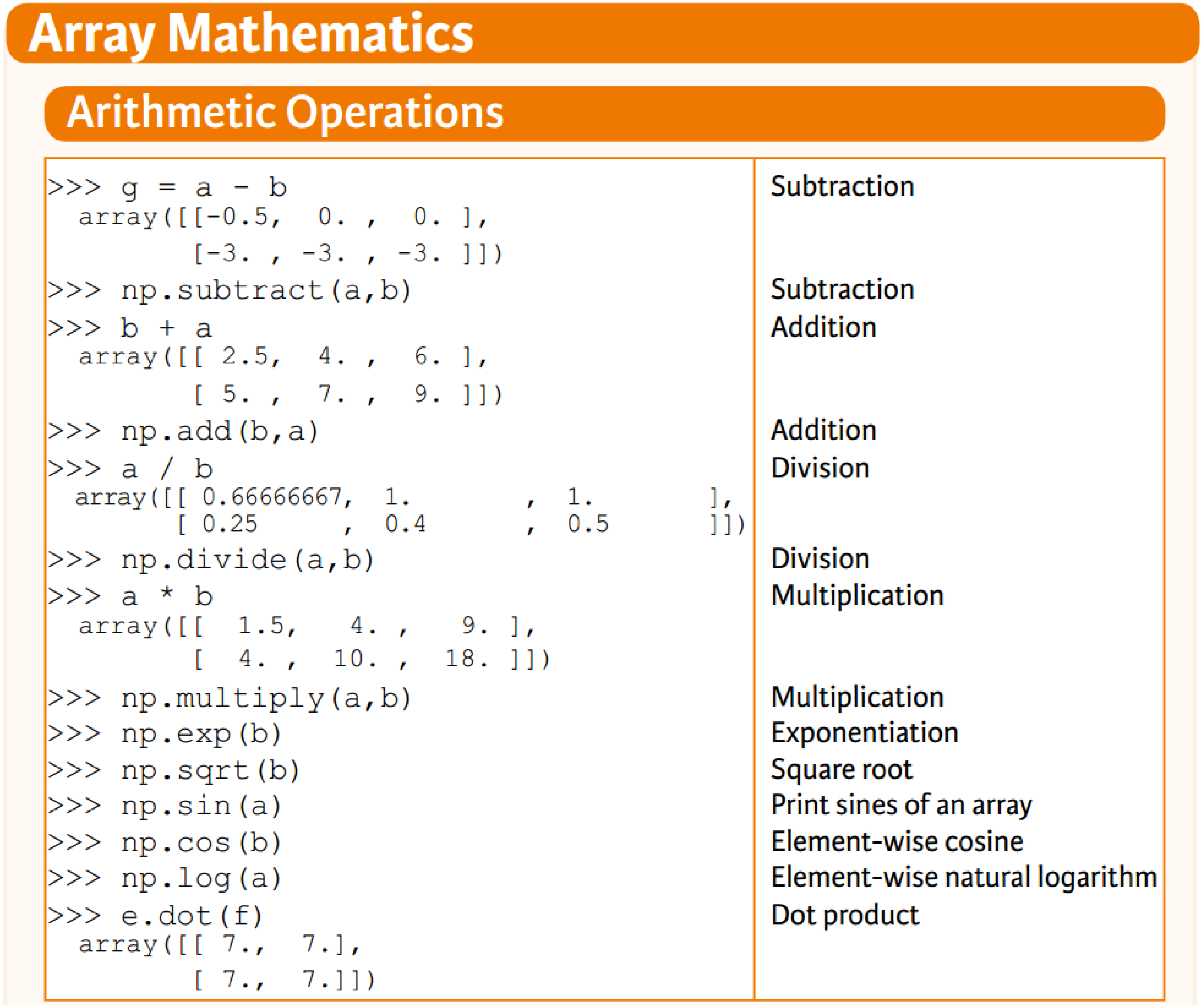
Data Types

`>>> np.int64`	Signed 64-bit integer types
`>>> np.float32`	Standard double-precision floating point
`>>> np.complex`	Complex numbers represented by 128 floats
`>>> np.bool`	Boolean type storing `TRUE` and `FALSE` values
`>>> np.object`	Python object type
`>>> np.string_`	Fixed-length string type
`>>> np.unicode_`	Fixed-length unicode type



Inspecting Your Array

`>>> a.shape`	Array dimensions
`>>> len(a)`	Length of array
`>>> b.ndim`	Number of array dimensions
`>>> e.size`	Number of array elements
`>>> b.dtype`	Data type of array elements
`>>> b.dtype.name`	Name of data type
`>>> b.astype(int)`	Convert an array to a different type



Array Mathematics

Arithmetic Operations

```
>>> g = a - b                                        Subtraction
  array([[-0.5,  0. ,  0. ],
         [-3. , -3. , -3. ]])
>>> np.subtract(a,b)                                 Subtraction
>>> b + a                                            Addition
  array([[ 2.5,  4. ,  6. ],
         [ 5. ,  7. ,  9. ]])
>>> np.add(b,a)                                      Addition
>>> a / b                                            Division
  array([[ 0.66666667,  1.        ,  1.        ],
         [ 0.25      ,  0.4       ,  0.5       ]])
>>> np.divide(a,b)                                   Division
>>> a * b                                            Multiplication
  array([[  1.5,   4. ,   9. ],
         [  4. ,  10. ,  18. ]])
>>> np.multiply(a,b)                                 Multiplication
>>> np.exp(b)                                        Exponentiation
>>> np.sqrt(b)                                       Square root
>>> np.sin(a)                                        Print sines of an array
>>> np.cos(b)                                        Element-wise cosine
>>> np.log(a)                                        Element-wise natural logarithm
>>> e.dot(f)                                         Dot product
  array([[ 7.,  7.],
         [ 7.,  7.]])
```

Comparison

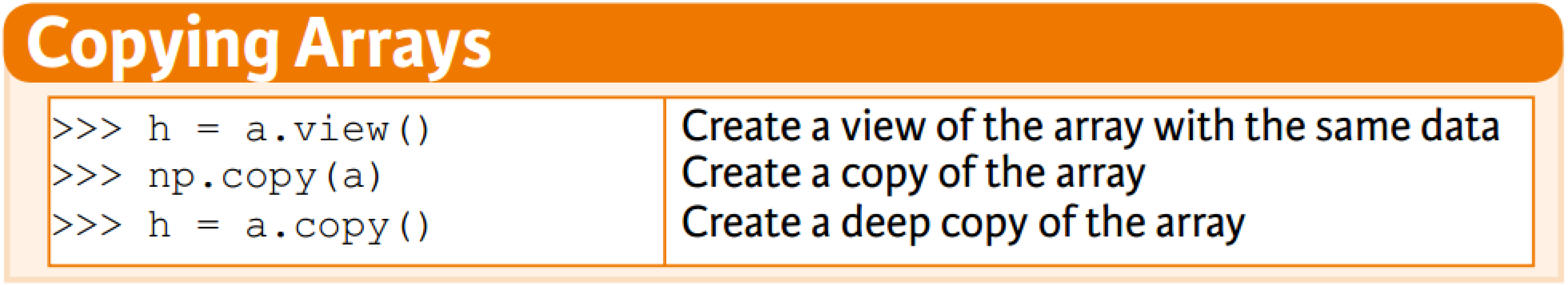
`>>> a == b`
`array([[False,  True,  True],`
`       [False, False, False]], dtype=bool)`
	Element-wise comparison

`>>> a < 2`
`array([True, False, False], dtype=bool)`
	Element-wise comparison

`>>> np.array_equal(a, b)`	Array-wise comparison

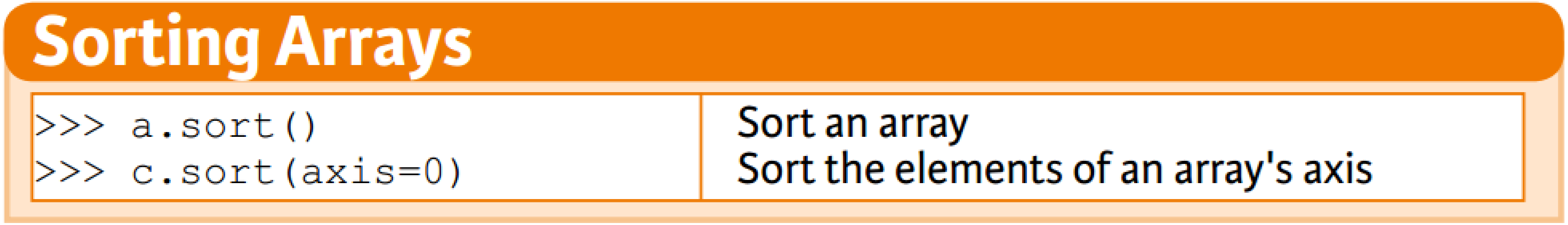
Aggregate Functions

`>>> a.sum()`	Array-wise sum
`>>> a.min()`	Array-wise minimum value
`>>> b.max(axis=0)`	Maximum value of an array row
`>>> b.cumsum(axis=1)`	Cumulative sum of the elements
`>>> a.mean()`	Mean
`>>> b.median()`	Median
`>>> a.corrcoef()`	Correlation coefficient
`>>> np.std(b)`	Standard deviation



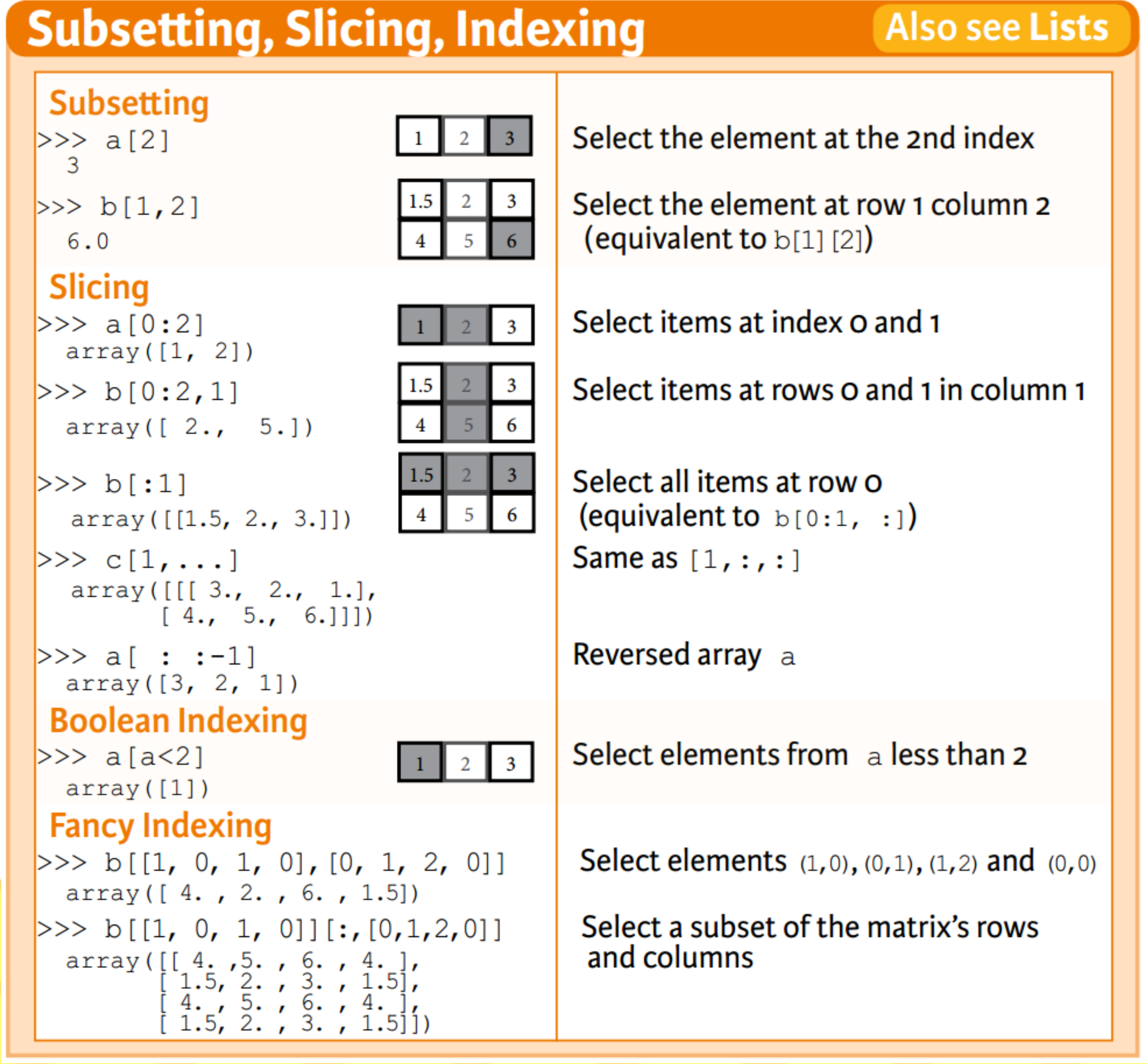
Copying Arrays

`>>> h = a.view()`	Create a view of the array with the same data
`>>> np.copy(a)`	Create a copy of the array
`>>> h = a.copy()`	Create a deep copy of the array



Sorting Arrays

`>>> a.sort()`	Sort an array
`>>> c.sort(axis=0)`	Sort the elements of an array's axis



Subsetting, Slicing, Indexing

Also see Lists

Subsetting

```
>>> a[2]
 3
```

Select the element at the 2nd index

```
>>> b[1,2]
 6.0
```

Select the element at row 1 column 2 (equivalent to `b[1][2]`)

Slicing

```
>>> a[0:2]
 array([1, 2])
```

Select items at index 0 and 1

```
>>> b[0:2,1]
 array([ 2.,  5.])
```

Select items at rows 0 and 1 in column 1

```
>>> b[:1]
  array([[1.5, 2., 3.]])
```

Select all items at row 0 (equivalent to `b[0:1, :]`)

```
>>> c[1,...]
  array([[[ 3.,  2.,  1.],
          [ 4.,  5.,  6.]]])
```

Same as `[1,:,:]`

```
>>> a[ : :-1]
 array([3, 2, 1])
```

Reversed array `a`

Boolean Indexing

```
>>> a[a<2]
 array([1])
```

Select elements from `a` less than 2

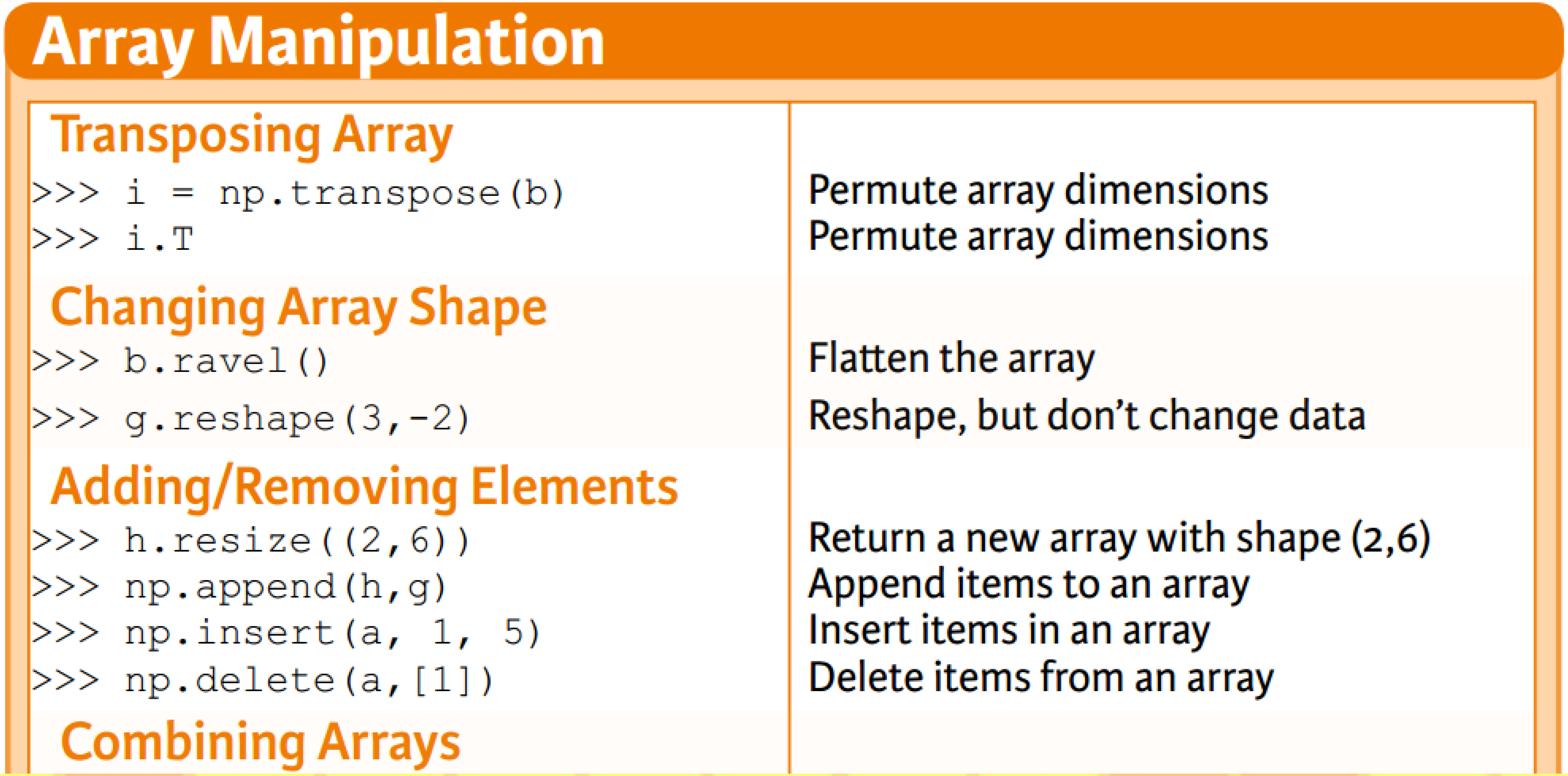
Fancy Indexing

```
>>> b[[1, 0, 1, 0],[0, 1, 2, 0]]
 array([ 4. , 2. , 6. , 1.5])
```

Select elements (1,0), (0,1), (1,2) and (0,0)

```
>>> b[[1, 0, 1, 0]][:,[0,1,2,0]]
 array([[ 4. ,5. , 6. , 4. ],
        [ 1.5, 2. , 3. , 1.5],
        [ 4. , 5. , 6. , 4. ],
        [ 1.5, 2. , 3. , 1.5]])
```

Select a subset of the matrix's rows and columns



Array Manipulation

Transposing Array

`>>> i = np.transpose(b)`	Permute array dimensions
`>>> i.T`	Permute array dimensions

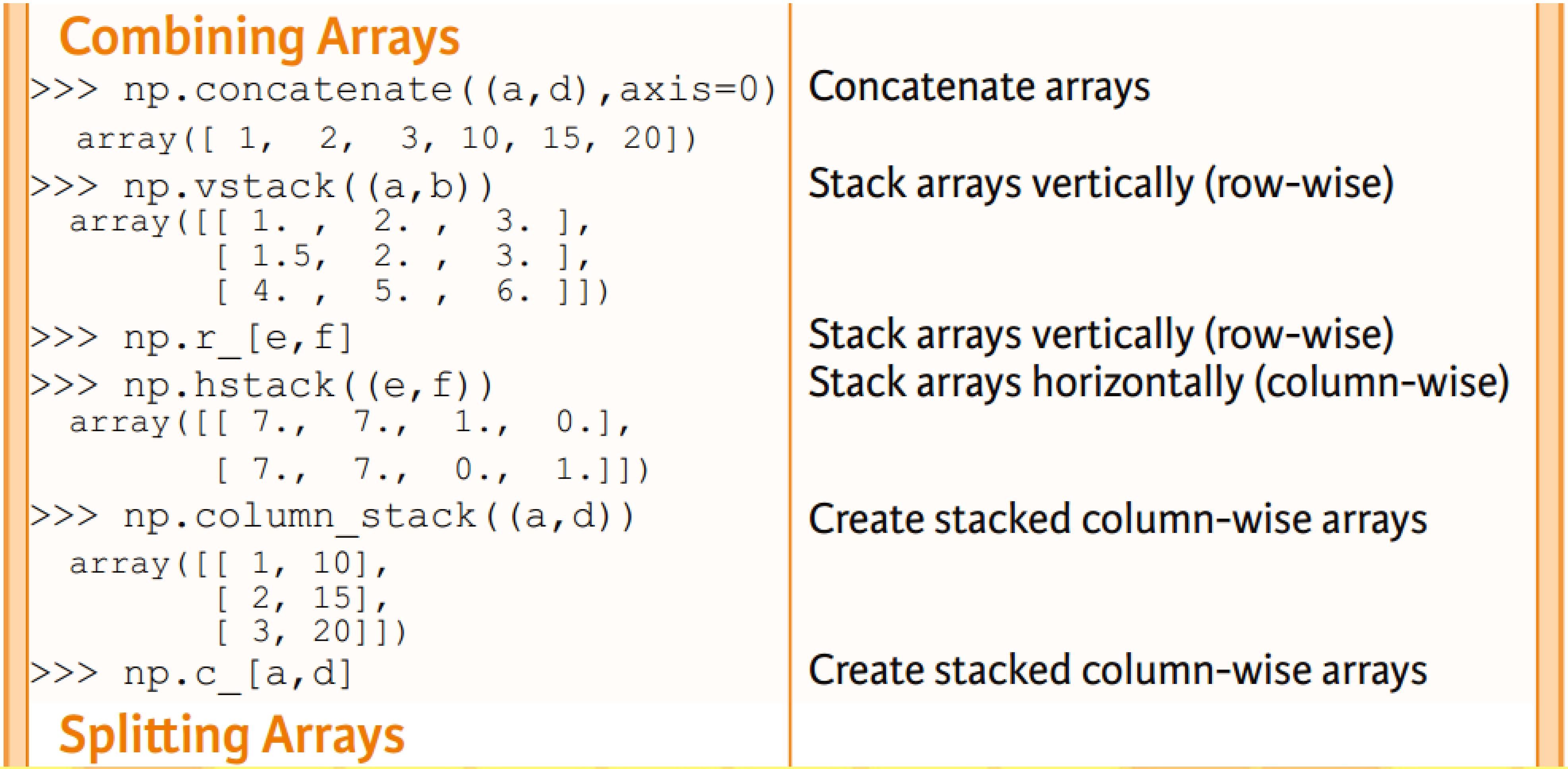
Changing Array Shape

`>>> b.ravel()`	Flatten the array
`>>> g.reshape(3,-2)`	Reshape, but don't change data

Adding/Removing Elements

`>>> h.resize((2,6))`	Return a new array with shape (2,6)
`>>> np.append(h,g)`	Append items to an array
`>>> np.insert(a, 1, 5)`	Insert items in an array
`>>> np.delete(a,[1])`	Delete items from an array

Combining Arrays



Combining Arrays

```
>>> np.concatenate((a,d),axis=0)
 array([ 1,  2,  3, 10, 15, 20])
```

Concatenate arrays

```
>>> np.vstack((a,b))
 array([[ 1. ,  2. ,  3. ],
        [ 1.5,  2. ,  3. ],
        [ 4. ,  5. ,  6. ]])
```

Stack arrays vertically (row-wise)

```
>>> np.r_[e,f]
```

Stack arrays vertically (row-wise)

```
>>> np.hstack((e,f))
 array([[ 7.,  7.,  1.,  0.],
        [ 7.,  7.,  0.,  1.]])
```

Stack arrays horizontally (column-wise)

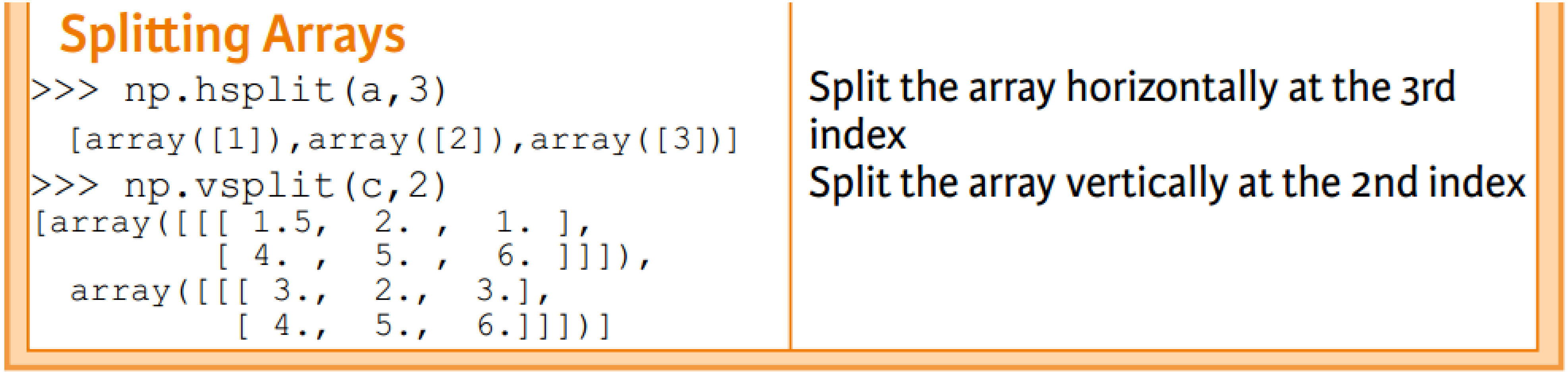
```
>>> np.column_stack((a,d))
 array([[ 1, 10],
        [ 2, 15],
        [ 3, 20]])
```

Create stacked column-wise arrays

```
>>> np.c_[a,d]
```

Create stacked column-wise arrays

Splitting Arrays



Splitting Arrays

```
>>> np.hsplit(a,3)
  [array([1]),array([2]),array([3])]
>>> np.vsplit(c,2)
[array([[[ 1.5,  2. ,  1. ],
         [ 4. ,  5. ,  6. ]]]),
  array([[[ 3.,  2.,  3.],
          [ 4.,  5.,  6.]]])]
```

Split the array horizontally at the 3rd index

Split the array vertically at the 2nd index

That’s All

- Source from DataCamp

Bài 7 ???

- Các module (thư viện) hay dùng cho Deep Learning
  - Đồ hoạ hoá dữ liệu của bạn:
- In ấn, hiển thị đồ hoạ, đồ thị, xuất ảnh ra file,… với matplotlib