NumPy Cheat Sheet (Python Developer Edition)

1. Importing

```
import numpy as np
```

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2. Creating Arrays

From list

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

2D array

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

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3. Built-in Array Creators

```
np.zeros(5)
np.ones((2,3))
np.full((2,2), 7)
np.arange(0, 10, 2)    # [0,2,4,6,8]
np.linspace(0, 1, 5)   # 5 values
np.eye(3)              # identity matrix
np.random.rand(2,3)
```

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4. Array Info

```
a.shape      # dimensions
a.ndim       # number of dims
a.size       # total elements
a.dtype      # data type
```

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5. Reshaping

```
a.reshape(2,3)
a.flatten()
a.ravel()    # view (faster)
```

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6. Indexing & Slicing

```
a[0]
a[1, 2]
a[:, 0]      # first column
a[1:4]       # slice rows
```

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7. Boolean Filtering

```
a[a > 5]
a[(a > 10) & (a < 20)]
```

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8. Math Operations

```
a + 5
a * 2
a1 + a2
np.sqrt(a)
np.log(a)
np.exp(a)
```

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9. Aggregate Functions

```
np.min(a)
np.max(a)
np.sum(a)
np.mean(a)
np.std(a)
np.var(a)
np.median(a)
```

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10. Axis-wise Operations

```
np.sum(a, axis=0)   # column-wise
np.sum(a, axis=1)   # row-wise
```

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11. Stacking Arrays

```
np.hstack([a, b])
np.vstack([a, b])
np.concatenate([a, b], axis=0)
```

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12. Copy vs View

```
b = a.copy()   # independent
c = a.view()   # shares memory
```

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13. Sorting

```
np.sort(a)
a.sort(axis=1)
```

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14. Linear Algebra

```
np.dot(a, b)
np.matmul(a, b)
np.linalg.inv(a)
np.linalg.det(a)
np.linalg.eig(a)
```

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15. Random Module

```
np.random.randint(1, 10, 5)
np.random.randn(3, 3)
np.random.choice([1, 2, 3], 10)
```

16. NaN Handling

```
np.isnan(a)
np.nan_to_num(a)
np.nanmean(a)
```

17. Broadcasting Rules

Works if shapes match from right side:

```
(3, 1) with (1, 4)
(5,) with (3,5)
```

Example:

```
np.array([1,2,3]) + np.array([[10],[20],[30]])
```

18. Common Conversions

```
a.tolist()           # numpy → python list
np.array(list)       # list → numpy
```

19. Save & Load

```
np.save("arr.npy", a)
np.load("arr.npy")
```