Python numpy reshape and stack cheatsheet

reshape & ravel

```
a1 = np.arange(1, 13)
```

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |

1	2	3	4
5	6	7	8
9	10	11	12

```
a1.reshape(3, 4)
a1.reshape(-1, 4)
a1.reshape(3, -1)
    .ravel()  # back to 1D
```

1	4	7	10
2	5	8	11
3	6	9	12

```
a1.reshape(3, -1, order='F')
    .ravel(order='F')  # back to 1D
```

3D array from 2D arrays

```
a1 = np.arange(1, 13).reshape(3, 4)
a2 = np.arange(13, 25).reshape(3, -1)
```
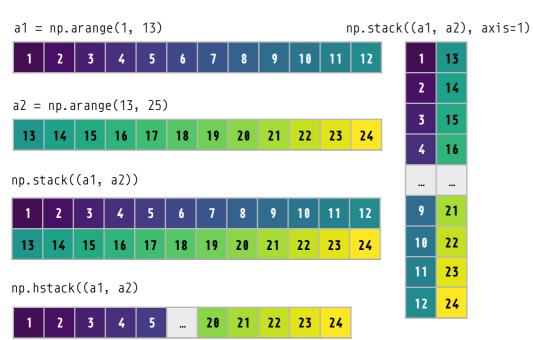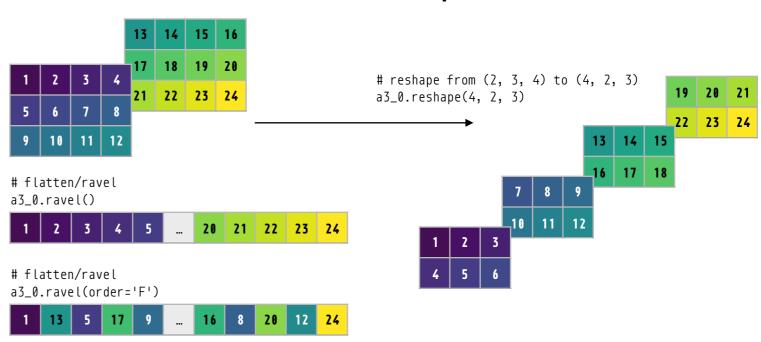
1	2	3	4
5	6	7	8
9	10	11	12

13	14	15	16
17	18	19	20
21	22	23	24

```
# stack along axis 2
a3_2 = np.stack((a1, a2), axis=2)
a3_2.shape: (3, 4, 2)

# retrieve a1
a3_2[:, :, 0]
```

9	21
10	22
11	23
12	24

5	17
6	18
7	19
8	20

1	13
2	14
3	15
4	16

```
# stack along axis 0
a3_0 = np.stack((a1, a2))
a3_0.shape: (2, 3, 4)
```

13	14	15	16
17	18	19	20
21	22	23	24

1	2	3	4
5	6	7	8
9	10	11	12

```
# retrieve a1
a3_0[0]
a3_0[0, :, :]
```

```
# stack along axis 1
a3_1 = np.stack((a1, a2), axis=1)
a3_1.shape: (3, 2, 4)
```

| 9 | 10 | 11 | 12 |
| 21 | 22 | 23 | 24 |

| 5 | 6 | 7 | 8 |
| 17 | 18 | 19 | 20 |

| 1 | 2 | 3 | 4 |
| 13 | 14 | 15 | 16 |

```
# retrieve a1
a3_1[:, 0, :]
```

stack

```
a1 = np.arange(1, 13)
```

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |

```
a2 = np.arange(13, 25)
```

| 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |

```
np.stack((a1, a2))
```

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |

```
np.hstack((a1, a2))
```

| 1 | 2 | 3 | 4 | 5 | … | 20 | 21 | 22 | 23 | 24 |

```
np.stack((a1, a2), axis=1)
```

1	13
2	14
3	15
4	16
…	…
9	21
10	22
11	23
12	24

flatten 3D array

13	14	15	16
17	18	19	20
21	22	23	24

1	2	3	4
5	6	7	8
9	10	11	12

```
# flatten/ravel
a3_0.ravel()
```

| 1 | 2 | 3 | 4 | 5 | … | 20 | 21 | 22 | 23 | 24 |

```
# flatten/ravel
a3_0.ravel(order='F')
```

| 1 | 13 | 5 | 17 | 9 | … | 16 | 8 | 20 | 12 | 24 |

reshape 3D array

```
# reshape from (2, 3, 4) to (4, 2, 3)
a3_0.reshape(4, 2, 3)
```

| 19 | 20 | 21 |
| 22 | 23 | 24 |

| 13 | 14 | 15 |
| 16 | 17 | 18 |

| 7 | 8 | 9 |
| 10 | 11 | 12 |

| 1 | 2 | 3 |
| 4 | 5 | 6 |