

## Numpy Arrays:

What are they and how are they different than lists?

- Numpy arrays are a grid of values. They can be multi-dimensional and all of the values must be the same type (i.e. integers). Different mathematical operations can be done on numpy arrays because the values are all numbers.
- The main difference between numpy arrays and lists is that lists can have different types of elements (i.e. integers, str, etc.) all in one.

How to make numpy arrays -- you can use several examples here:

- `np.zeros(# rows, # columns)`
- `np.ones(# rows, # columns)`
- `np.arange(#)`
- `np.random`

How to index and slice numpy arrays:

- Index (taken from previous cheat sheet): Indexing is a way to give individual values/words/data a position within a list and be able to refer to various parts of the list without having to look through every single value within the list (slicing).

Index Position	0	1	2	3	4	5	6	7	8	9
List	1	2	3	4	5	6	7	8	9	10
Index Position	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1

- Slice: Slicing is a way to look at a range of items in a list by “slicing” the list into different parts.
  - Example:

`Array1 = [start:stop: step]`

- (Start: Stop: Step) and has to be repeated for every dimension [rows, column]
- If nothing is listed at step, it is assumed to be in intervals of one.
- If nothing is listed for stop, it just goes to the end.

Example of Index/Slicing for an array:

```
Array1 = np.array([1, 2, 3])
```

- Initial array definition using 3 floats

```
Array1[0]
```

- Gives us the value "1"

```
Array[1:3]
```

- Gives us: [2, 3]

Key methods associated with numpy arrays:

- Any mathematical operation
  - `np.ones(10) * 7`
- `np.arange`
- `np.reshape`
- `np.append`
- `np.random`

Key attributes associated with numpy arrays:

- `Array1.shape`
- `Array1.size`
- `Array1.ndim`
- `Array1.dtype`

Summarize important numpy functions that you have used:

- `np.zeros`, `np.ones`, and `np.random` are important ones I have used to create an array in order to practice other functions, attributes, and general indexing/slicing techniques.