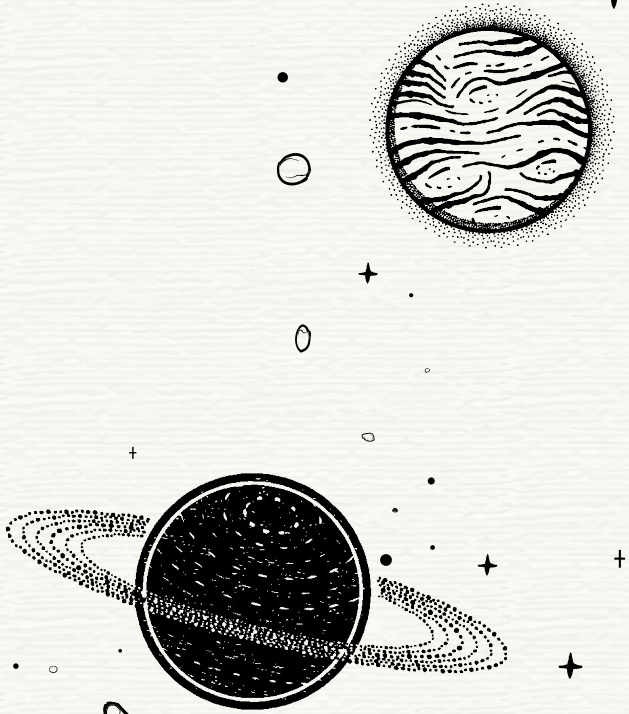
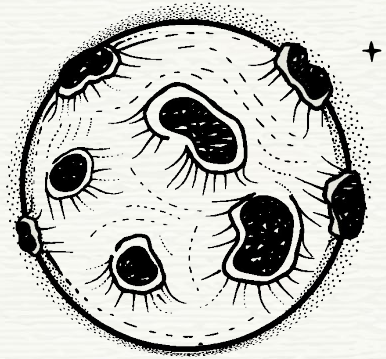
Python DeCal
Week 7

Numpy Arrays



Announcements

HW 4 due Tonight



HW 5 released

Final Project

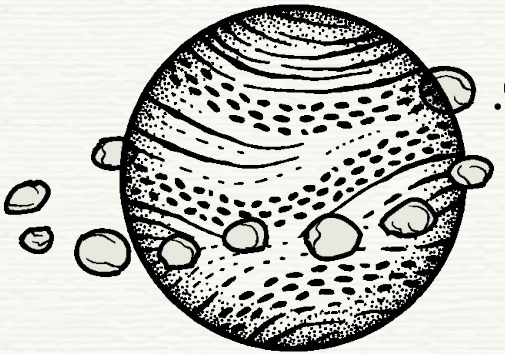
Numpy!

Import Numpy

- `pip install numpy` or `conda install numpy` <- in your terminal
- `import numpy as np` <- at the top on your file
  - Used to call Numpy functions
    - Ex. np.sqrt(x)

Arrays

What's the big deal 🙄🤣



… they're like lists!

- A list but much more powerful
- Initialize:
  - `arr = np.array([])`

notice the brackets inside the parentheses!

- Can store any data type
- The same operations you would use for a list, you can use for an array

What's the difference??

- Make two arrays (say [1, 2, 3] and [2, 4, 6])
  - What happens when you add them?
  - What happens when you add two lists?

Operations with Arrays

Adding and Subtracting:

Adds/subtracts each corresponding value together

Multiplying and Dividing:

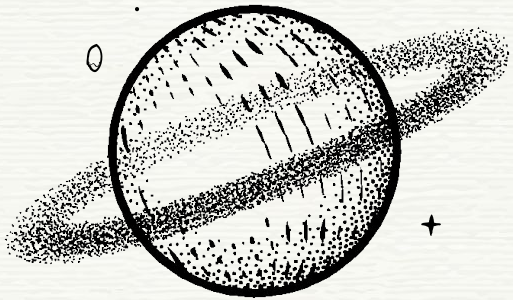
Multiplies/adds each value together

How does this make arrays more powerful?

🤔

Your turn!

- Take the sum of the numbers 1 through 100 (inclusive) in two ways:
  - Once with a for loop
  - Once with arrays
    - You'll have to look up some useful functions 🤓



Other (statistical) functions

np.mean()

np.std()

np.median()

ALL TAKE IN ARRAYS AS INPUTS

2D Arrays and Slicing

😭😜

2D Arrays

- Arrays can be multidimensional
  - `arr = np.array([[1, 2], [3, 4]])` → $\begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$
- Indexed slightly different

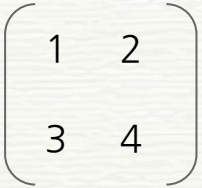
Slicing

- How to index:
  - `arr[row, column]` or `arr[row][column]`

```
>>> arr[0][1]

2
```

- Select a row:
  - `arr[row, :]`
- Same logic for column



Slicing

- What if I wanted everything after the first row?

```
>>> arr[1:]
array([3, 4],
       [5, 6])
```

$$\begin{pmatrix} 1 & 2 \\ 3 & 4 \\ 5 & 6 \end{pmatrix}$$

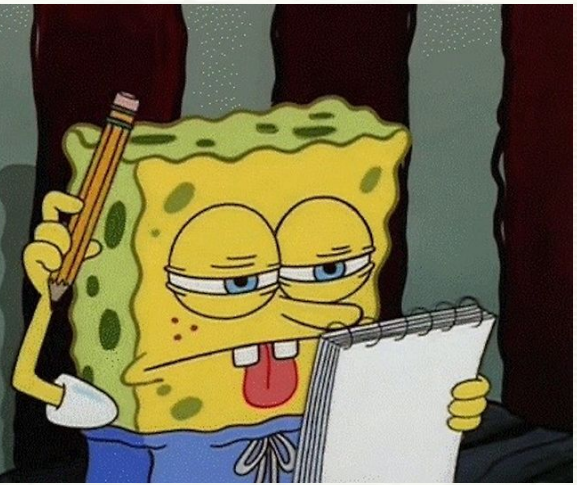
Slicing

- How do I get the last 2 columns?
- What if I wanted every other row? Or every other column?

Useful functions

- np.max()
- np.min()
- np.sum()
- np.ones(numValues)
  - Returns an array of ones of length numValues
- np.zeros(numValues)
- np.random.random(numValues)
  - Returns an array of random numbers of length numValues

What about the rest???



You'll learn as you do problems :)

Resources

Numpy Beginner's Guide

https://numpy.org/doc/stable/user/absolute_beginners.html

Lookup a function!

The documentation is usually the first option