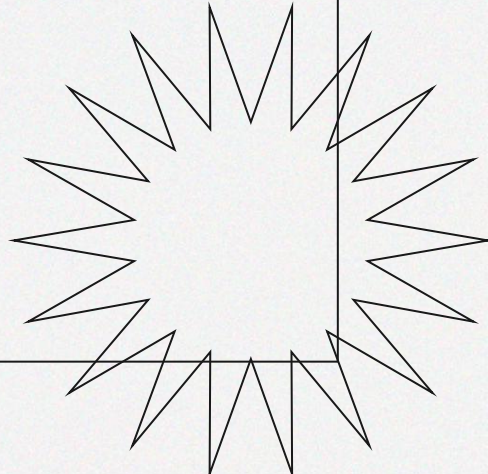
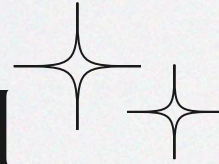


# INTRODUCTION TO COMPUTER PROGRAMMING IN PYTHON

Lesson 3  
Astro Scholars 2022





# Review

## Python as a Calculator

Do basic mathematical operations by following the order of operations – PEMDAS

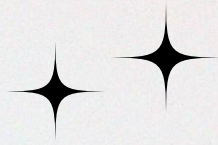
## Types

Text: `str`  
Numeric: `int`,  
`float`,  
`complex`  
Sequence: `list`,  
`tuple`, `range`  
Mapping: `dict`  
Boolean: `bool`  
Indexing

## Iteration

Loop through data sequentially

- For loops





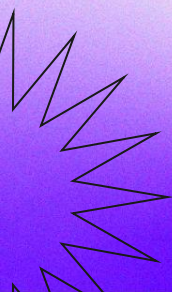


# **SIMPLE PLOT**





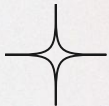
# Matplotlib

- A Python **library** for **data visualization**
  - For a basic plot of an image:
    1. **Read** the data so the computer can understand it
    2. Use Matplotlib to display the data as a **2D array** (every coordinate on a graph corresponds to a pixel value of the image)
- 





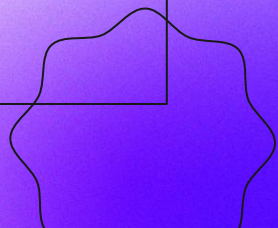
# ARRAYS



# Arrays

- Hold many values under a single variable name
  - You can access the values by referring to an index number, as we did with lists, but this time, you will have to index by row and column
- You can do operations on all the values in an array at once
- You can loop through individual values
- You can operate on multiple arrays at once
- To work with arrays in Python, we use the library `Numpy`

MAKE AN IMAGE OF AN ARRAY WITH CORRESPONDING INDICES HERE

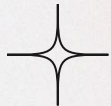






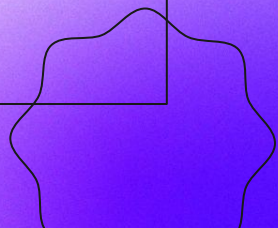
# PLOTS





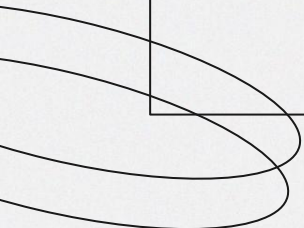
# Plotting

- First, you create a figure and set of axes and set optional settings like the figure size and number of plots (default is one if you don't specify otherwise)
  - `fig, ax = plt.subplots(figsize=[12,6])`
- Then, you use the axes object you created, and tell Matplotlib what you want to plot on those axes, you can repeat this command with different data to plot multiple data on the same set of axes
  - `ax.plot(xdata,ydata)`
- Finally, once you are done plotting, tell matplotlib that you are ready to see the created figure
  - `plt.show()`





# RESOURCES

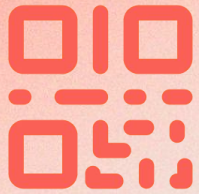






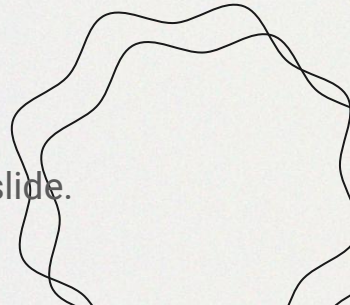
# Exit Ticket





**Join at [slido.com](https://slido.com)  
#934385**

① Start presenting to display the joining instructions on this slide.







**1. At what point(s) were you most engaged as a learner?**

① Start presenting to display the poll results on this slide.





**2. What concept from today's lecture would you like more elaboration or understanding about?**

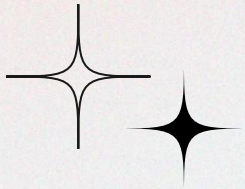
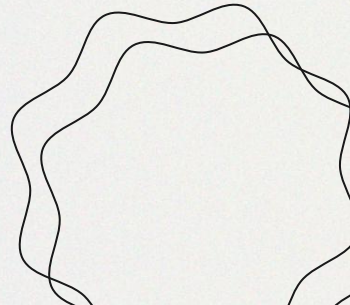
① Start presenting to display the poll results on this slide.





### **3. At what point(s) were you least engaged as a learner?**

① Start presenting to display the poll results on this slide.







**Questions?**



