

Before you turn this problem in, make sure everything runs as expected. First, **restart the kernel** (in the menu bar, select Kernel -> Restart) and then run all cells (in the menu bar, select Cell -> Run All).

Make sure you fill in any place that says "YOUR CODE HERE" or "YOUR ANSWER HERE", as well as your name and collaborators below:

```
In [ ]: NAME = "Abhishek Varma"
COLLABORATORS = "None"
```

## General Instructions

- 1 - Start by downloading this jupyter notebook to your local machine
- 2 - Open a tab in your browser and type <https://colab.research.google.com>
- 3 - This will open a small window. Choose the last option on the upper menu, "Upload". Then choose the jupyter notebook you have saved in step 1
- 4 - You can start working on your assignment by answering the questions in the corresponding cells.
- 5 - If you have any questions , please reach out to the instructor and TAs

## MAT115: Statistics (MAT115/116) - Assignment 1

### Introduction to Variables Location Based Assignment

This assignment is a location based-assignment that will require you to interact with the city around you in a new way. Simply put, the objective is to measure a variable in a city in the Guntur district. You will identify a measurable variable in the city and then create an estimate using the Fermi estimation technique. Next, you will complete the data collection, calculate descriptive statistics on the data, and create relevant data visualizations. You will also have a chance to apply your knowledge of probability and simulation to solve a problem. This is an individual assignment. Everything you submit should be your own words and reflect your own understanding of the material.

#### NOTES:

Anything marked as optional will only be scored if it is completed correctly. You must upload two files:

- **Primary Resource:** A PDF of your entire assignment. Run all cells before converting the notebook to a PDF, and double check to make sure that the PDF is complete with all sections visible. Email attachments will not be accepted. If you're having difficulty converting your notebook to a PDF, try the tips available [here](#).
- **Secondary Resource:** A zipped folder containing the .ipynb file and your original photo files.

### PART 1: VARIABLE SELECTION [#variables]

Select a neighborhood in a city in the Guntur district. Visit this neighborhood and spend at least 30 minutes exploring the neighborhood to find your variable.

Important notes:

- The variable must be something that can be measured at different locations in the city. You need to make at least 10 different measurements of this variable, one for each location. The locations must be at least 100 meters away from each other.
- You must be able to calculate the mean, median, mode, and standard deviation of the variable.
- Be clear about your choice of locations to make the variable measurements.
- Get creative! Try to choose an interesting and informative variable and make sure to justify why the variable you have chosen is interesting.

#### 1. Define and operationalize your variable here.

Describe how you selected your variable. Specifically identify the type of variable, and whether you will be measuring a total, proportion, or average. Also identify the units it will be measured in and explain in detail how you will measure it. Make sure that your explanation is clear enough that another student would understand how to make the same measurement. Give the address of the 10 or more locations where you will conduct your measurement and provide an image that clearly identifies these locations on a map. (<150 words)

The variable I have selected is the number of parcels taken from a hotel in one day. I have selected this variable in order to know the average food parceled from the hotel in one day. It helps us to know how many people prefer taking food parceled from hotel. My variable is a Quantitative discrete variable as the number of parcels taken from the hotels are countable and has a fixed whole number as value. I will be measuring the average of my data as I want to know how many people prefer taking food home. **PROCEDURE:-** 1)I went to Guntur District to measure the values for my variable. Then I visited 10 hotels as referred below. 2)After going to the hotel I have interacted with the manager of the hotel and told them to keep the data of how many parcels the people are taking from their hotel. 3)I have done the same thing for the other 9 hotels. 4)I have noted the information about the food parcels from each hotel. The 10 locations I have used to measure the variables are: 1)Drunkn Monkey-8-87-25, Ground Floor, Chaitika Apartments 5TH Lane, Main Road 2)Hangout-Dr no: 5-87-402 Lakshmisuram main road, Guntur, Andhra Pradesh 522007 3)The Box-KLP School Play Ground, road, lane, beside Franco's natural ice-cream, S.V.N Colony, Navabharath Nagar, Guntur, Andhra Pradesh 522006 4)Burger Stores-D no: 4-20-23 Ground Floor Beside ThickshakeFactory, Ring road, Sodharath Nagar, Guntur, Andhra Pradesh 522006 5)CINNAMON-5-87-571 Main Road Opposite Kalamkuthan, Lakshimpuram, Guntur, Andhra Pradesh 522007 6) APSARA ice cream:- Happy Foods, Shop No.2, Next to Vnu School Sidhartha, Krishna Nagar Main Rd, Gujanagundla, Guntur, Andhra Pradesh 522007 7) THICK SHAKE FACTORY-Ring Rd, Nalandra Nagar, Navabharath Nagar, Guntur, Andhra Pradesh 522006 8)Domicos- Ground Floor Annapuram Commercial Complex, Lakshimpuram Main Rd, Guntur, Andhra Pradesh 522007 9)BISTRO- Brindavan Gardens, Guntur, Andhra Pradesh 522006 10) GISMAT-Awaravelli Road, 8th Line, beside Heru Pharmacy, Bhairathpet, Guntur, Andhra Pradesh 522007 I measured the data by directly asking the number of number of parcels taken from the hotels. I doestnary units as it has constant whole number or numerical.

#### 2. Discuss variable relationships.

- **2.1 (<150 words)**
  - A. Describe a scenario in which your variable could be an independent variable.
  - B. What could be the dependent variable(s)?
  - C. What are some possible extraneous or confounding variables in this scenario?

The variable I chose can be independent variable for the variables like "income of the chef" etc. the variables that could be dependent on my variable are the "income of the hotel owner" and "income of the people working in the hotel" it is dependent on my variable as the increment in their salary occurs when the food parcels are more confounding variables are "infrastructure of the hotel" if the infrastructure is good many people will like eat in the hotel, which effect the above mentioned dependent and independent variable.

- **2.2 (<150 words)**
  - A. Describe a scenario in which your variable could be a dependent variable.
  - B. What could be the independent variable(s)?
  - C. What are some possible extraneous or confounding variables in this scenario?

The number of parcels taken from the hotel are dependent upon some variables like "cost of the food", "taste of the food", it is dependent as the taste increases the number of parcels taken increases the confounding variables are "advertisement of hotel".

### PART 2: ESTIMATION AND MEASUREMENT [#variables]

**Important note:** If there is any reason to believe that you did not authentically complete the location based portion of this assignment, this will be referred to the Academic Committee, and you risk receiving zeros in all your grades (as per the course policy in the syllabus). Please follow the instructions here carefully and include the original photo files in the zip folder along with the .ipynb.

1. Go to a Cafe in the neighborhood of your choice to produce a Fermi estimate of your variable. Use a napkin at a cafe to begin your Fermi estimate. It helps us to know how many people prefer taking food parceled from hotel. My variable is a Quantitative discrete variable as the number of parcels taken from the hotels are countable and has a fixed whole number as value. I will be measuring the average of my data as I want to know how many people prefer taking food home. **PROCEDURE:-** 1)I went to Guntur District to measure the values for my variable. Then I visited 10 hotels as referred below. 2)After going to the hotel I have interacted with the manager of the hotel and told them to keep the data of how many parcels the people are taking from their hotel. 3)I have done the same thing for the other 9 hotels. 4)I have noted the information about the food parcels from each hotel. The 10 locations I have used to measure the variables are: 1)Drunkn Monkey-8-87-25, Ground Floor, Chaitika Apartments 5TH Lane, Main Road 2)Hangout-Dr no: 5-87-402 Lakshmisuram main road, Guntur, Andhra Pradesh 522007 3)The Box-KLP School Play Ground, road, lane, beside Franco's natural ice-cream, S.V.N Colony, Navabharath Nagar, Guntur, Andhra Pradesh 522006 4)Burger Stores-D no: 4-20-23 Ground Floor Beside ThickshakeFactory, Ring road, Sodharath Nagar, Guntur, Andhra Pradesh 522006 5)CINNAMON-5-87-571 Main Road Opposite Kalamkuthan, Lakshimpuram, Guntur, Andhra Pradesh 522007 6) APSARA ice cream:- Happy Foods, Shop No.2, Next to Vnu School Sidhartha, Krishna Nagar Main Rd, Gujanagundla, Guntur, Andhra Pradesh 522007 7) THICK SHAKE FACTORY-Ring Rd, Nalandra Nagar, Navabharath Nagar, Guntur, Andhra Pradesh 522006 8)Domicos- Ground Floor Annapuram Commercial Complex, Lakshimpuram Main Rd, Guntur, Andhra Pradesh 522007 9)BISTRO- Brindavan Gardens, Guntur, Andhra Pradesh 522006 10) GISMAT-Awaravelli Road, 8th Line, beside Heru Pharmacy, Bhairathpet, Guntur, Andhra Pradesh 522007 I measured the data by directly asking the number of number of parcels taken from the hotels. I doestnary units as it has constant whole number or numerical.

2. Take some photos to document this experience. You must include:

- A photo just of your "back of the napkin" estimate (It can and should be quite rough at this point). You will properly format this calculation later.
- A selfie in the cafe in which you constructed your Fermi estimate. Clearly show your face, your Fermi estimate, and some of the interior of the cafe.
- A selfie outside of the cafe showing your face and the exterior of the cafe, including the name. Bonus points if you are also holding your completed Fermi estimate in the photo too.

3. Typeset your full estimation in the Python notebook. Here, be sure to clearly explain all steps, justify all assumptions, and comment on whether the answer seems plausible.
4. It is time to collect your data! Once again, take some photos to document your experience. Include at least two photos of your variable collection process. At least one photo should include your face and the variable you are counting.

Follow the instructions in this [link](#) to upload your pictures to the jupyter notebook:

```
In [1]: from IPython.display import Image, display
Image(filename="A0.jpg",height=400,width=400)
```



```
In [2]: from IPython.display import Image, display
Image(filename="A02.jpg",height=400,width=400)
```



```
In [3]: from IPython.display import Image, display
Image(filename="A03.jpg",height=400,width=400)
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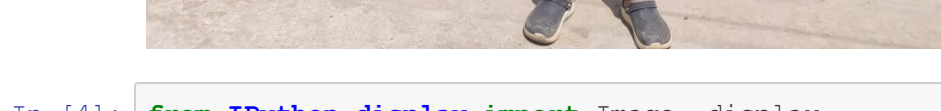
```
In [4]: from IPython.display import Image, display
Image(filename="A04.jpg",height=400,width=400)
```



```
In [5]: from IPython.display import Image, display
Image(filename="A05.jpg",height=400,width=400)
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```
In [6]: from IPython.display import Image, display
Image(filename="A06.jpg",height=400,width=400)
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```
In [7]: from IPython.display import Image, display
Image(filename="A07.jpg",height=400,width=400)
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```
In [8]: from IPython.display import Image, display
Image(filename="A08.jpg",height=400,width=400)
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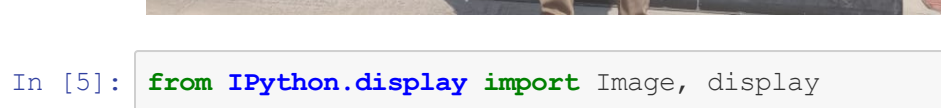
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In [9]: from IPython.display import Image, display
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```
In [10]: from IPython.display import Image, display
Image(filename="A10.jpg",height=400,width=400)
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In [11]: from IPython.display import Image, display
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In [12]: from IPython.display import Image, display
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In [13]: from IPython.display import Image, display
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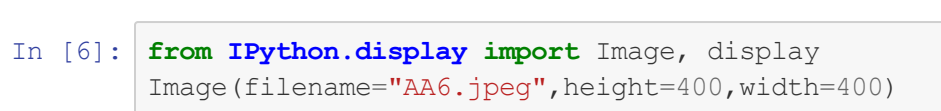
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In [14]: from IPython.display import Image, display
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In [15]: from IPython.display import Image, display
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In [16]: from IPython.display import Image, display
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In [17]: from IPython.display import Image, display
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In [18]: from IPython.display import Image, display
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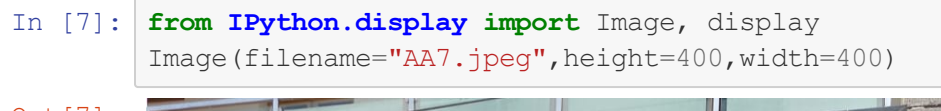
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In [20]: from IPython.display import Image, display
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In [21]: from IPython.display import Image, display
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In [22]: from IPython.display import Image, display
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In [23]: from IPython.display import Image, display
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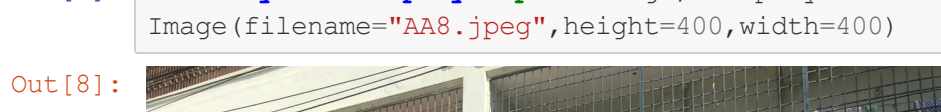
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In [24]: from IPython.display import Image, display
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In [25]: from IPython.display import Image, display
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In [26]: from IPython.display import Image, display
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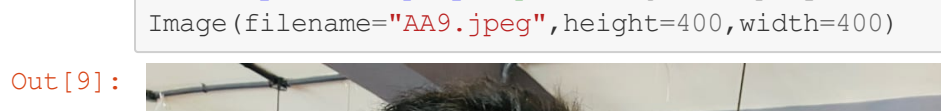
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In [28]: from IPython.display import Image, display
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In [29]: from IPython.display import Image, display
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In [30]: from IPython.display import Image, display
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In [31]: from IPython.display import Image, display
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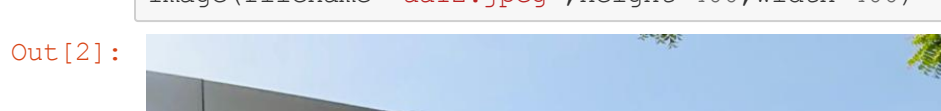
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In [32]: from IPython.display import Image, display
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In [33]: from IPython.display import Image, display
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In [34]: from IPython.display import Image, display
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In [35]: from IPython.display import Image, display
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In [36]: from IPython.display import Image, display
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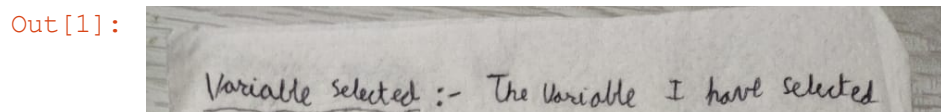
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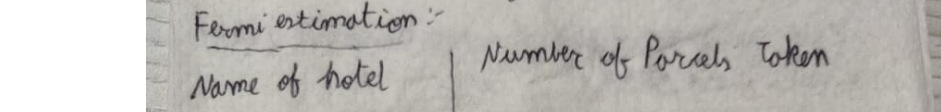
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In [38]: from IPython.display import Image, display
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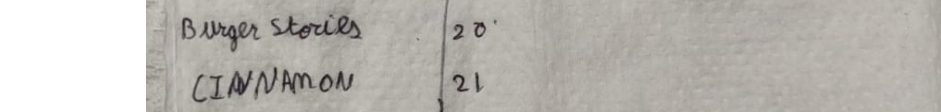
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In [39]: from IPython.display import Image, display
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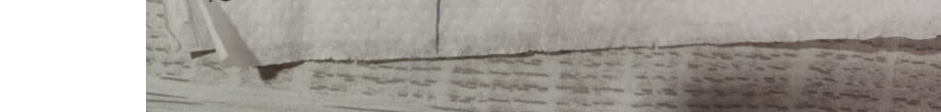
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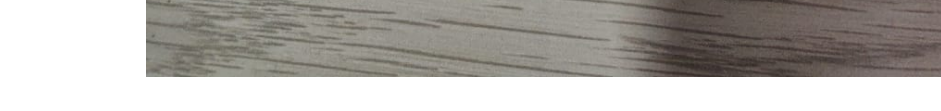
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In [41]: from IPython.display import Image, display
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```
In [42]: from IPython.display import Image, display
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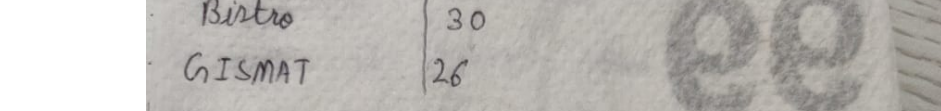
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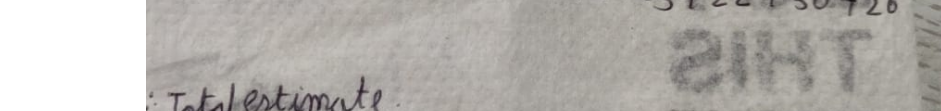
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In [44]: from IPython.display import Image, display
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```
In [45]: from IPython.display import Image, display
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```
In [46]: from IPython.display import Image, display
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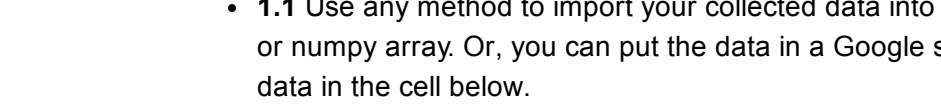
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```
In [48]: from IPython.display import Image, display
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In [49]: from IPython.display import Image, display
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```
In [50]: from IPython.display import Image, display
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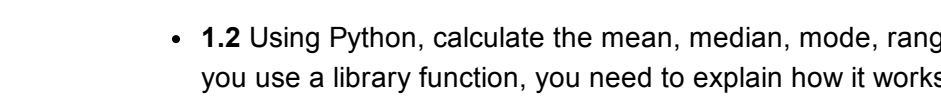
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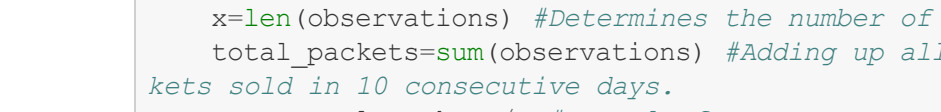
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In [52]: from IPython.display import Image, display
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```
In [53]: from IPython.display import Image, display
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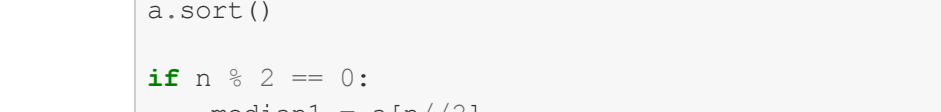
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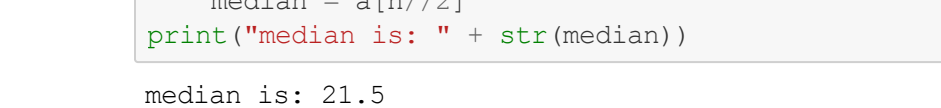
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In [55]: from IPython.display import Image, display
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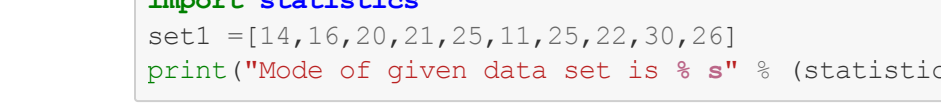
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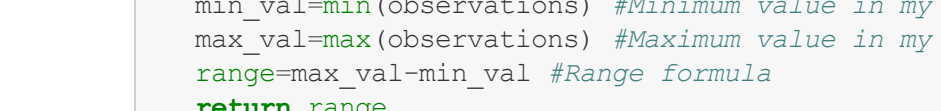
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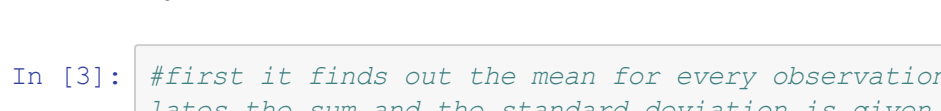
```
In [58]: from IPython.display import Image, display
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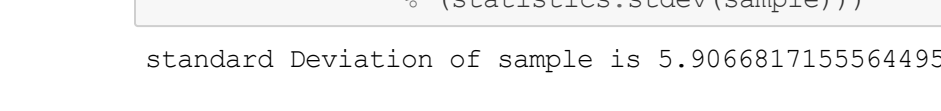
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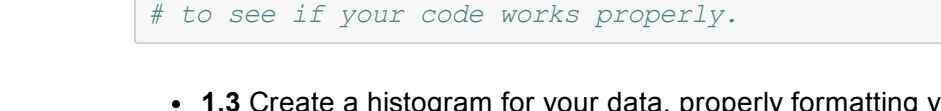
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In [60]: from IPython.display import Image, display
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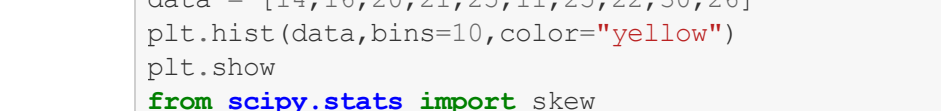
```
In [61]: from IPython.display import Image, display
Image(filename="A61.jpg",height=400,width=400)
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```
In [62]: from IPython.display import Image, display
Image(filename="A62.jpg",height=400,width=400)
```



```
In [63]: from IPython.display import Image, display
Image(filename="A63.jpg",height=400,width=400)
```



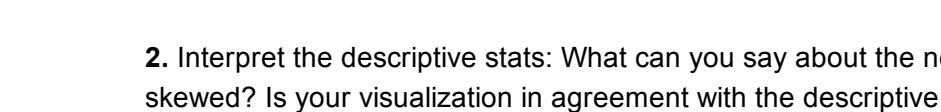
```
In [64]: from IPython.display import Image, display
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```



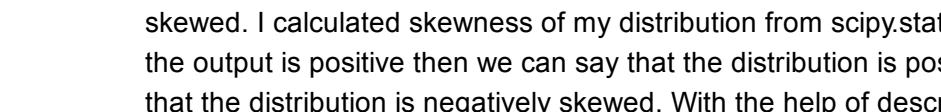
```
In [65]: from IPython.display import Image, display
Image(filename="A65.jpg",height=400,width=400)
```



```
In [66]: from IPython.display import Image, display
Image(filename="A66.jpg",height=400,width=400)
```



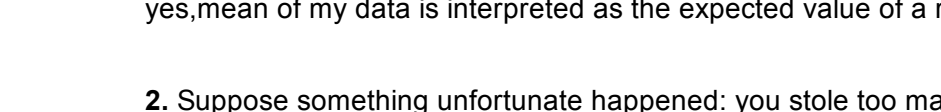
```
In [67]: from IPython.display import Image, display
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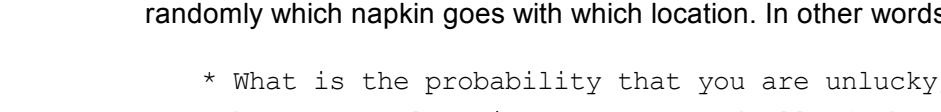
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In [68]: from IPython.display import Image, display
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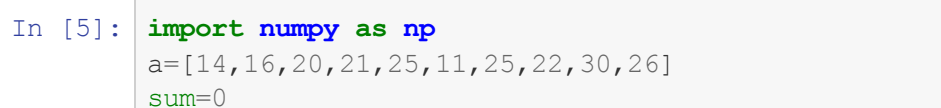
```
In [69]: from IPython.display import Image, display
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```



```
In [70]: from IPython.display import Image, display
Image(filename="A70.jpg",height=400,width=400)
```



```
In [71]: from IPython.display import Image, display
Image(filename="A71.jpg",height=400,width=400)
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```
In [72]: from IPython.display import Image, display
Image(filename="A72.jpg",
```