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Exercise Set 22: "Reject it or Fail!" or a Lab on "Hypothesis Testing"

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ENGR 1330 Exercise Set 22

Exercise 1

The data below are the impact strength of packaging materials in foot-pounds of two branded boxes. Produce a histogram of the two series, and determine if there is evidence of a difference in mean strength between the two brands. Use an appropriate hypothesis test to support your assertion at a level of significance of $\alpha = 0.10$.

Amazon Branded Boxes	Walmart Branded Boxes
1.25	0.89
1.16	1.01
1.33	0.97
1.15	0.95
1.23	0.94
1.20	1.02
1.32	0.98
1.28	1.06
1.21	0.98
1.14	0.94
1.17	1.02
1.34	0.98

Deliverables:

- Working scripts that produce perform the necessary tests

- Narrative (or print blocks) that supply answer questions
- CCMR citations for sources (URL for outside sources is OK)

Hints:

- A suggested set of code cells is listed below
- Add/remove cells as needed for your solution

```
In [5]: # define lists and make into dataframe
info={ "Amazon Branded Boxes" : [1.25 , 1.16 , 1.33 , 1.15 , 1.23 , 1.20,1.32,1.28,1.21
    "Walmart Branded Boxes" : [0.89 , 1.01 , 0.97 , 0.95 , 0.94,1.02,0.98,1.06,0.98,

import statistics as stat
import numpy as np
import matplotlib.pyplot as plt
import pandas as pd

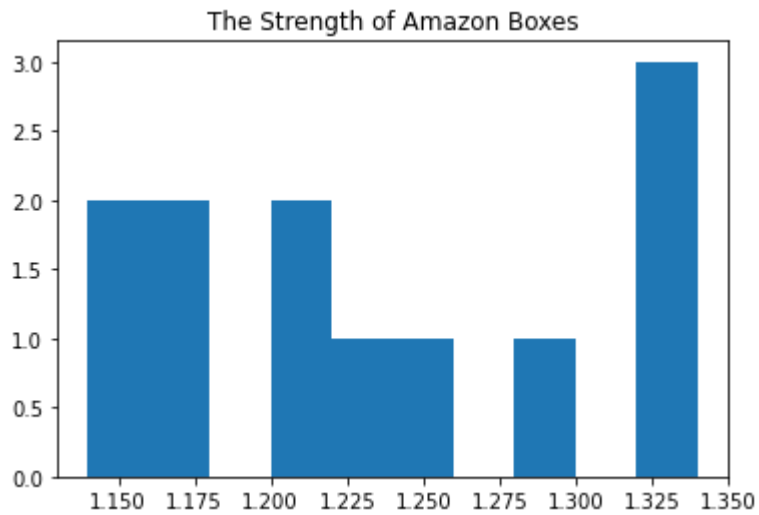
dfd=pd.DataFrame(info)
print(dfd)
```

	Amazon Branded Boxes	Walmart Branded Boxes
0	1.25	0.89
1	1.16	1.01
2	1.33	0.97
3	1.15	0.95
4	1.23	0.94
5	1.20	1.02
6	1.32	0.98
7	1.28	1.06
8	1.21	0.98
9	1.14	0.94
10	1.17	1.02
11	1.34	0.98

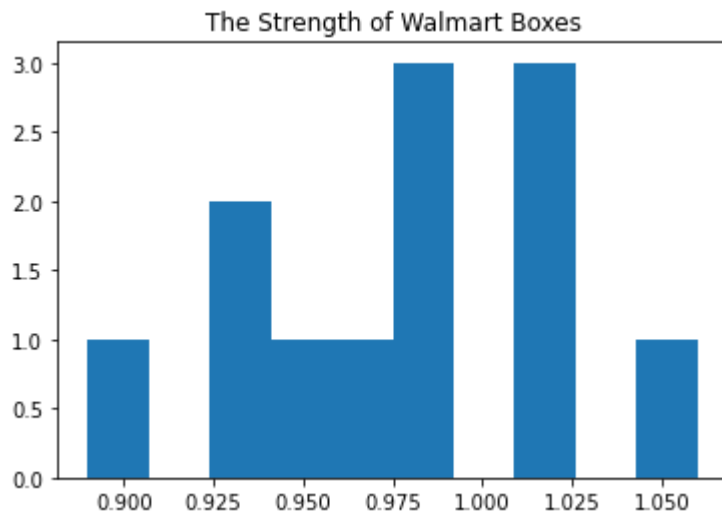
describe lists/dataframe

The data shows the strength of 11 Amazon brand boxes and 11 Walmart Brand boxes and our goal is to see which is stronger

```
In [8]: # histograms
plt.hist(data['Amazon Branded Boxes'])
plt.title('The Strength of Amazon Boxes')
plt.show()
```

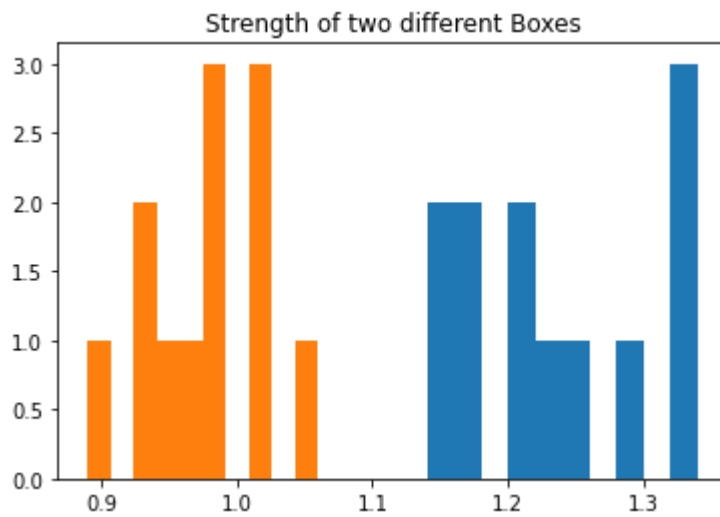


```
In [9]: plt.hist(data['Walmart Branded Boxes'])  
plt.title('The Strength of Walmart Boxes')  
plt.show()
```



```
In [10]: # hypothesis tests are means same? (test for normality then t-test if normal; mann-whit  
plt.hist(data['Amazon Branded Boxes'])  
plt.hist(data['Walmart Branded Boxes'])  
plt.title('Strength of two different Boxes')  
plt.show
```

```
Out[10]: <function matplotlib.pyplot.show(close=None, block=None)>
```



```
In [11]: dfd.describe()
```

```
Out[11]:
```

	Amazon Branded Boxes	Walmart Branded Boxes
count	12.000000	12.000000
mean	1.231667	0.978333
std	0.072216	0.045494
min	1.140000	0.890000
25%	1.167500	0.947500
50%	1.220000	0.980000
75%	1.290000	1.012500
max	1.340000	1.060000

interpret findings (could be a markdown cell, or embed into code)

As we can see overall AMAZON BRANDED BOXES ARE STRONGER DUE TO MEAN,STF,MIN AND MAX

```
In [ ]:
```