



**Pibi**

Visualization



## 2 Main Applications:

### 1. Exploration

1. During data analysis
2. Helps to find errors and create new hypotheses
3. Often interactive

### 2. Reporting

1. Report results to stakeholders (your boss, the scientific community, the general public)
  2. Must be carefully designed to match your audience
  3. Typically static (infographic)
-

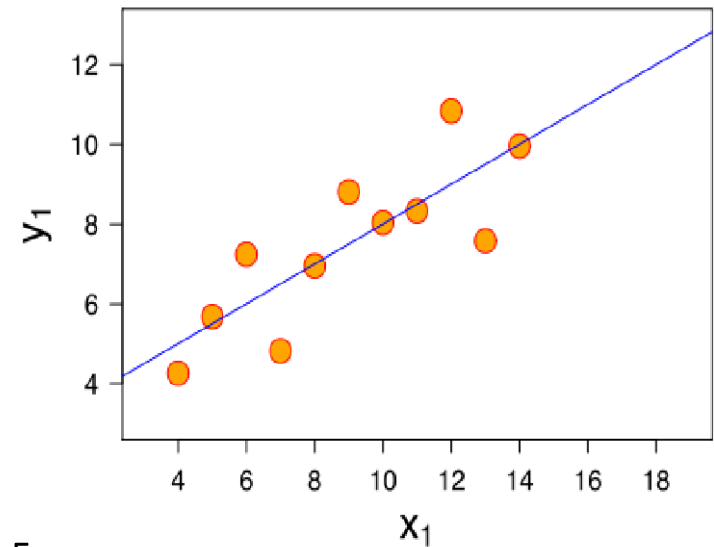


## Example: Exploration

I"	
x"	y"
10.0"	8.04"
8.0"	6.95"
13.0"	7.58"
9.0"	8.81"
11.0"	8.33"
14.0"	9.96"
6.0"	7.24"
4.0"	4.26"
12.0"	10.84"
7.0"	4.82"
5.0"	5.68"

Mean of x	9
Variance of x	10
Mean of y	7.5
Variance of y	3.75
Correlation between x and y	0.816

**Linear regression** line  $y = 3.0 + 0.5x$



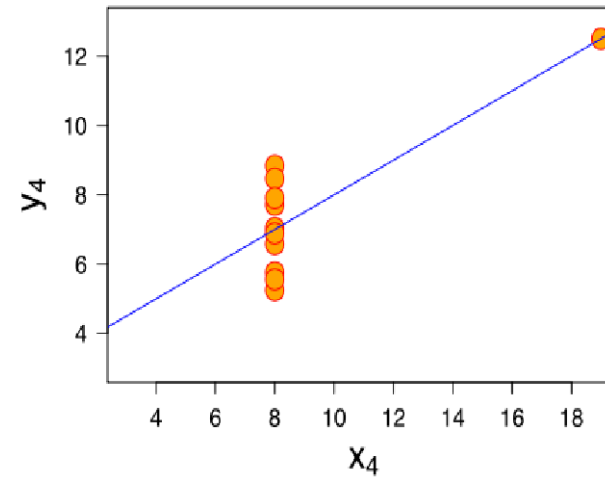
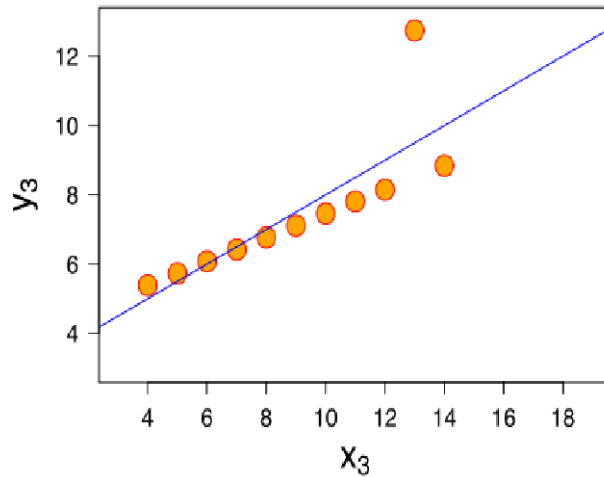
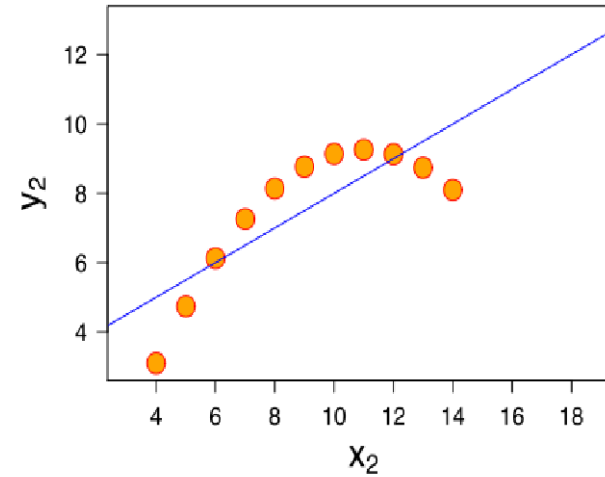
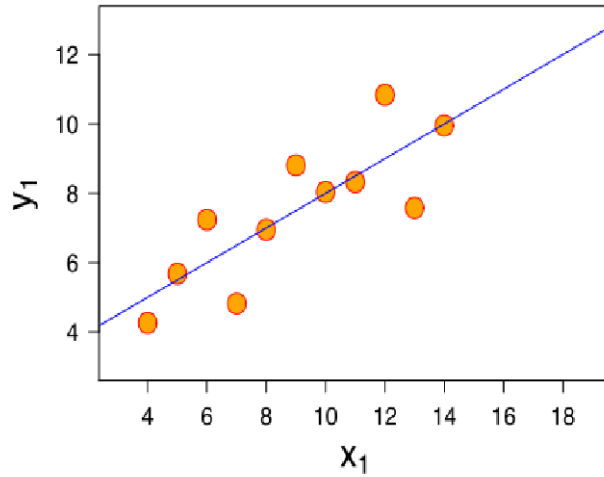


## Example: Exploration

I''		II''		III''		IV''	
x''	y''	x''	y''	x''	y''	x''	y''
10.0''	8.04''	10.0''	9.14''	10.0''	7.46''	8.0''	6.58''
8.0''	6.95''	8.0''	8.14''	8.0''	6.77''	8.0''	5.76''
13.0''	7.58''	13.0''	8.74''	13.0''	12.74''	8.0''	7.71''
9.0''	8.81''	9.0''	8.77''	9.0''	7.11''	8.0''	8.84''
11.0''	8.33''	11.0''	9.26''	11.0''	7.81''	8.0''	8.47''
14.0''	9.96''	14.0''	8.10''	14.0''	8.84''	8.0''	7.04''
6.0''	7.24''	6.0''	6.13''	6.0''	6.08''	8.0''	5.25''
4.0''	4.26''	4.0''	3.10''	4.0''	5.39''	19.0''	12.5''
12.0''	10.84''	12.0''	9.13''	12.0''	8.15''	8.0''	5.56''
7.0''	4.82''	7.0''	7.26''	7.0''	6.42''	8.0''	7.91''
5.0''	5.68''	5.0''	4.74''	5.0''	5.73''	8.0''	6.89''



## Example: Anscombe's quartet

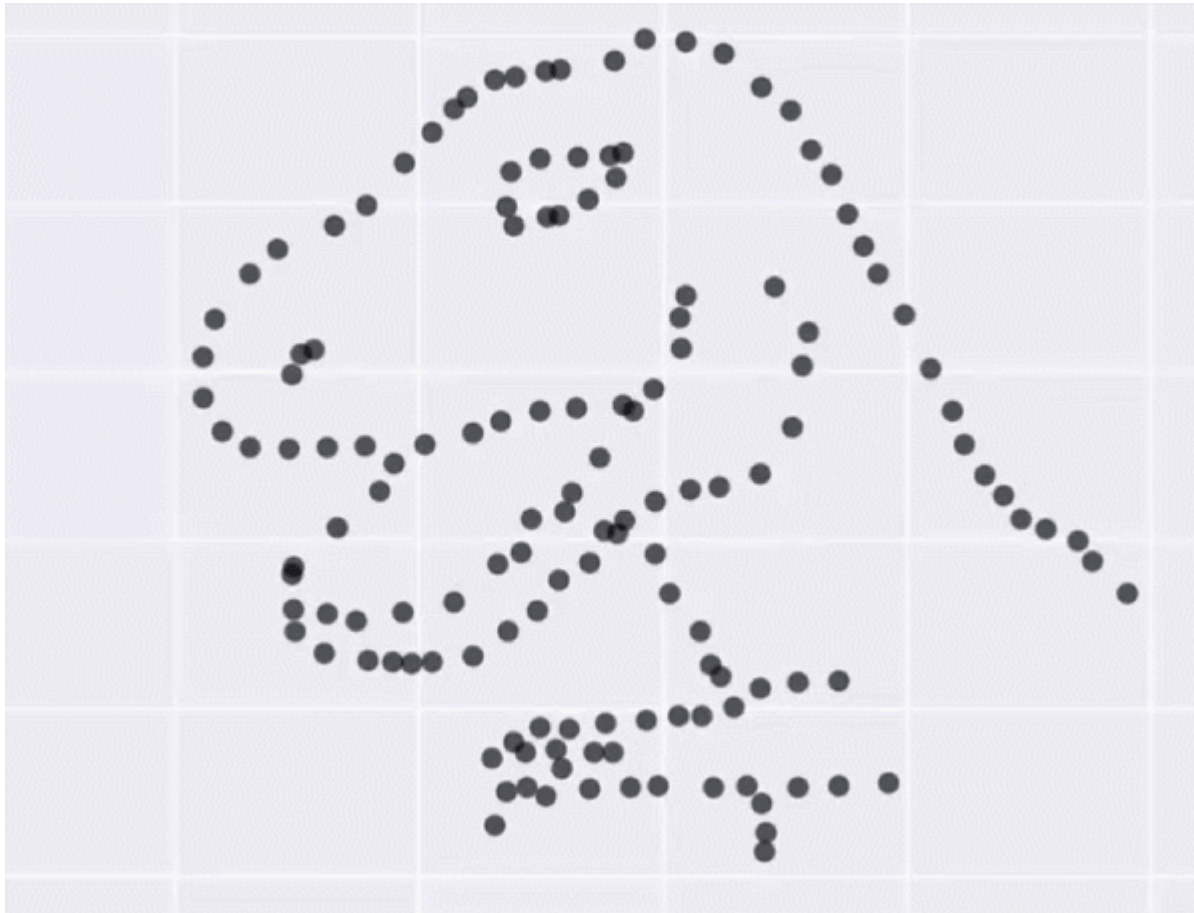


[https://en.wikipedia.org/wiki/Anscombe's\\_quartet](https://en.wikipedia.org/wiki/Anscombe's_quartet)

See also <https://www.autodeskresearch.com/publications/samestats>



## Example: The Datasaurus Dozen



X Mean = 54.26, X SD = 16.76

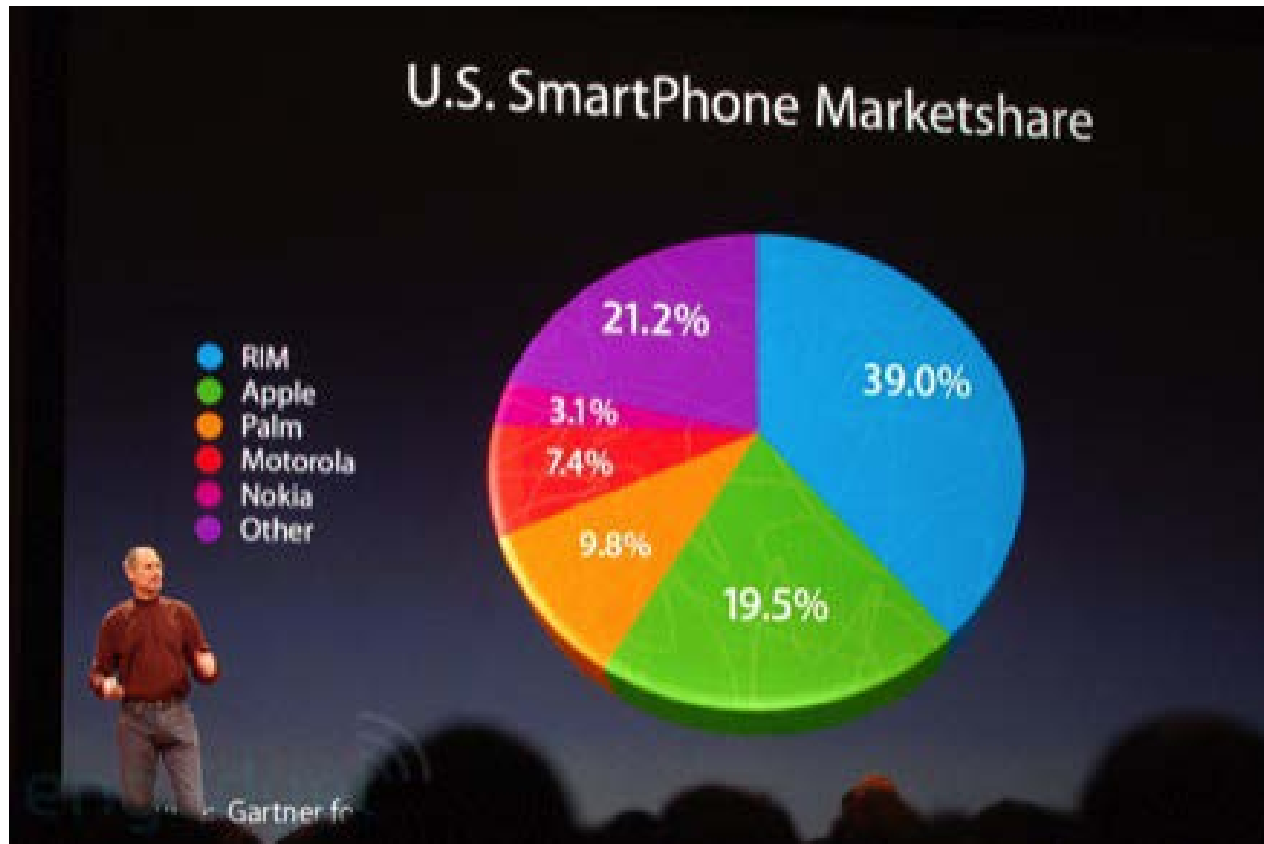
Y Mean = 47.83, Y SD = 26.93, Correlation = -0.06

[https://en.wikipedia.org/wiki/Anscombe's\\_quartet](https://en.wikipedia.org/wiki/Anscombe's_quartet)

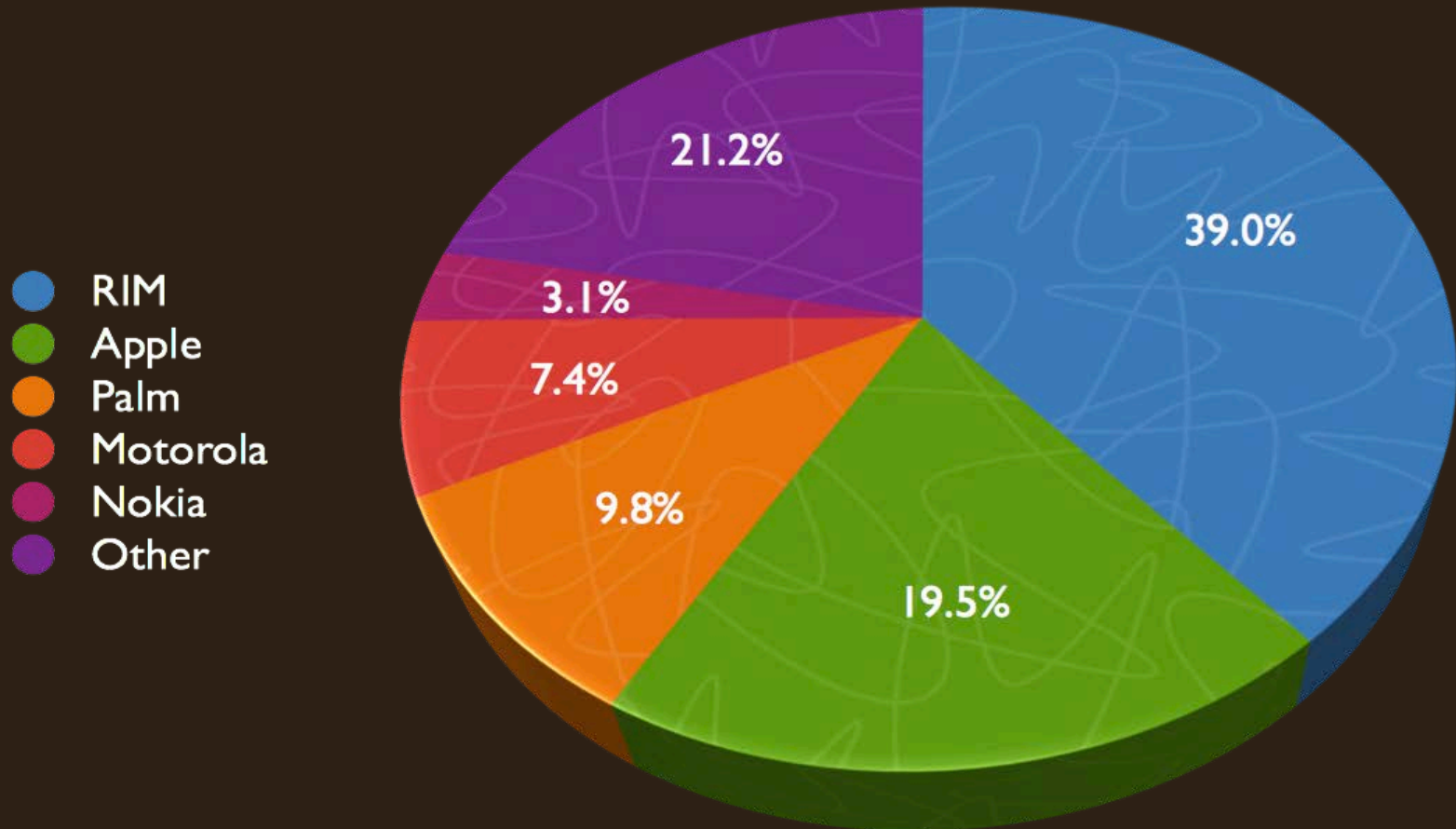
See also <https://www.autodeskresearch.com/publications/samestats>



## Example: Reporting



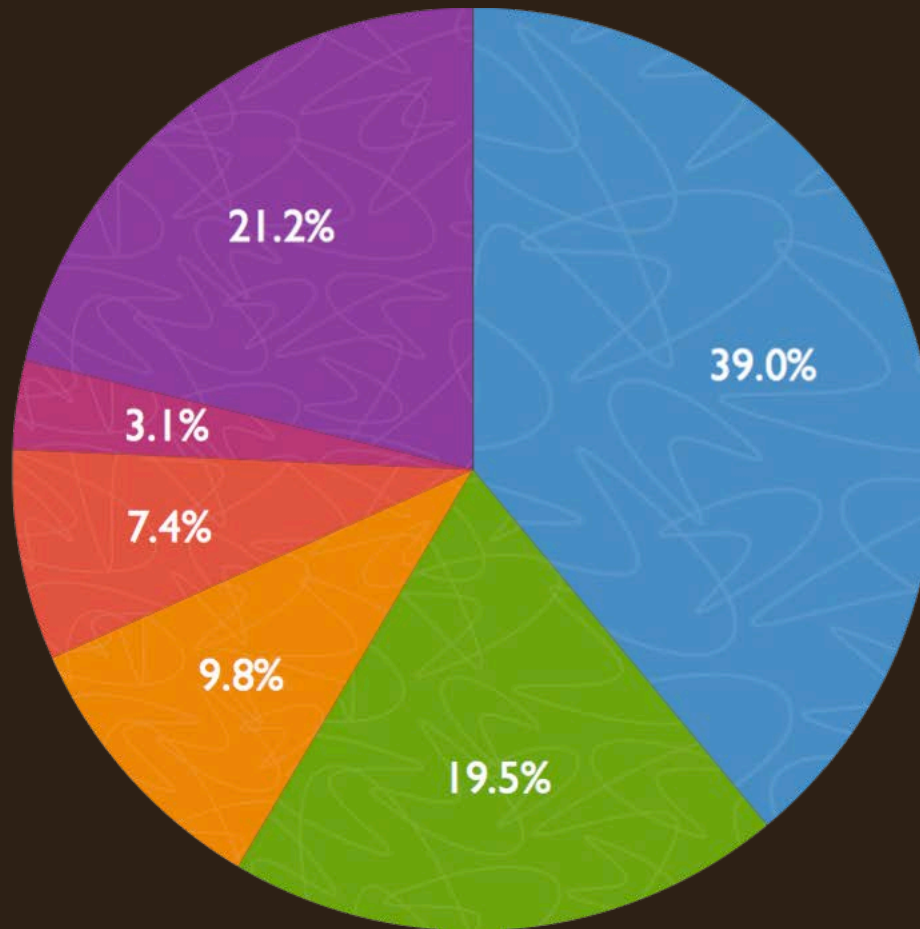
## U.S. Smartphone Marketshare



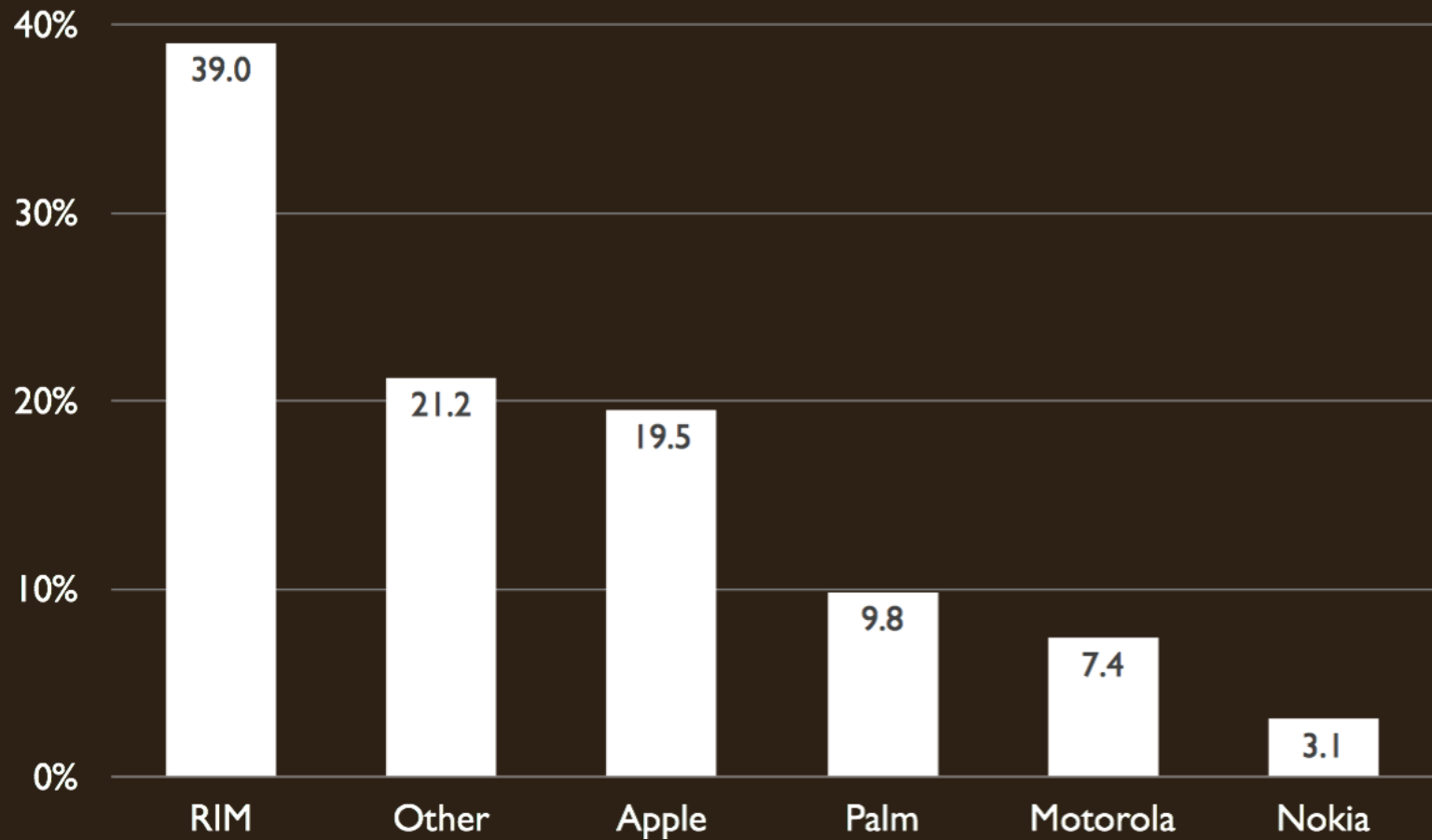


## U.S. Smartphone Marketshare

- RIM
- Apple
- Palm
- Motorola
- Nokia
- Other



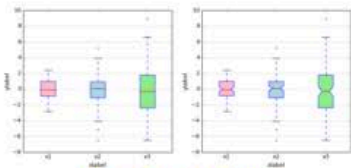
## U.S. Smartphone Marketshare



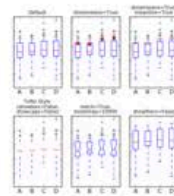


- <http://matplotlib.org/>
- 2D plotting library for high-quality figures

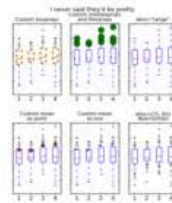
<http://matplotlib.org/gallery.html>



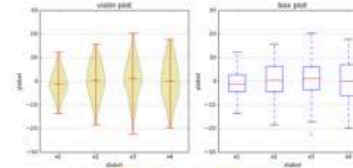
boxplot\_color\_demo



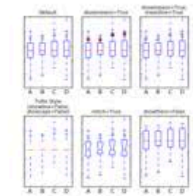
boxplot\_demo



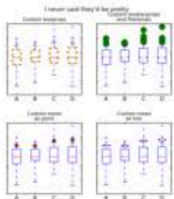
boxplot\_demo



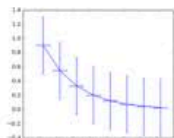
boxplot\_vs\_violin\_demo



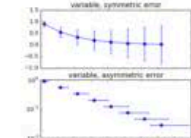
bxp\_demo



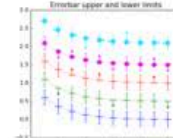
bxp\_demo



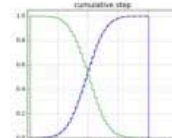
errorbar\_demo



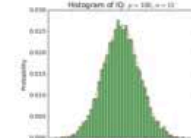
errorbar\_demo\_features



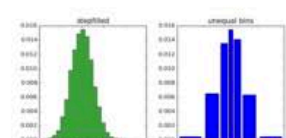
errorbar\_limits



histogram\_demo\_cumulative



histogram\_demo\_features



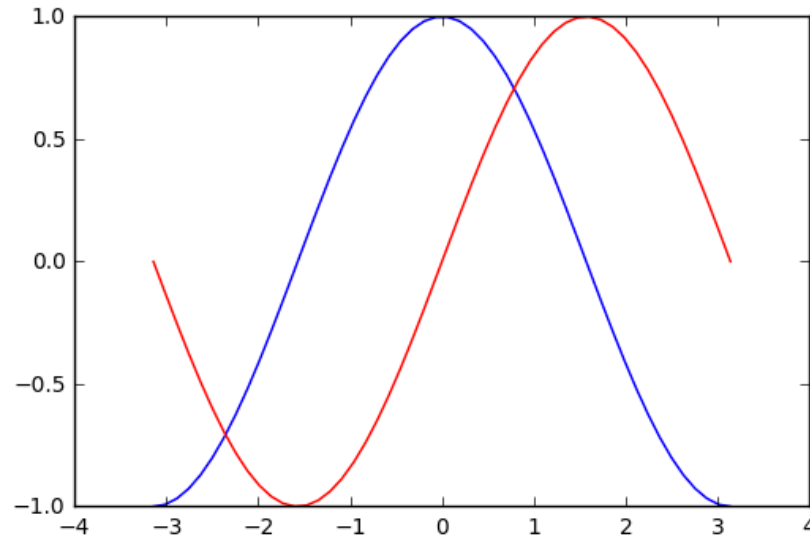
histogram\_demo\_histtypes



- <http://matplotlib.org/>
- 2D plotting library for high-quality figures
- Can be embedded in jupyter

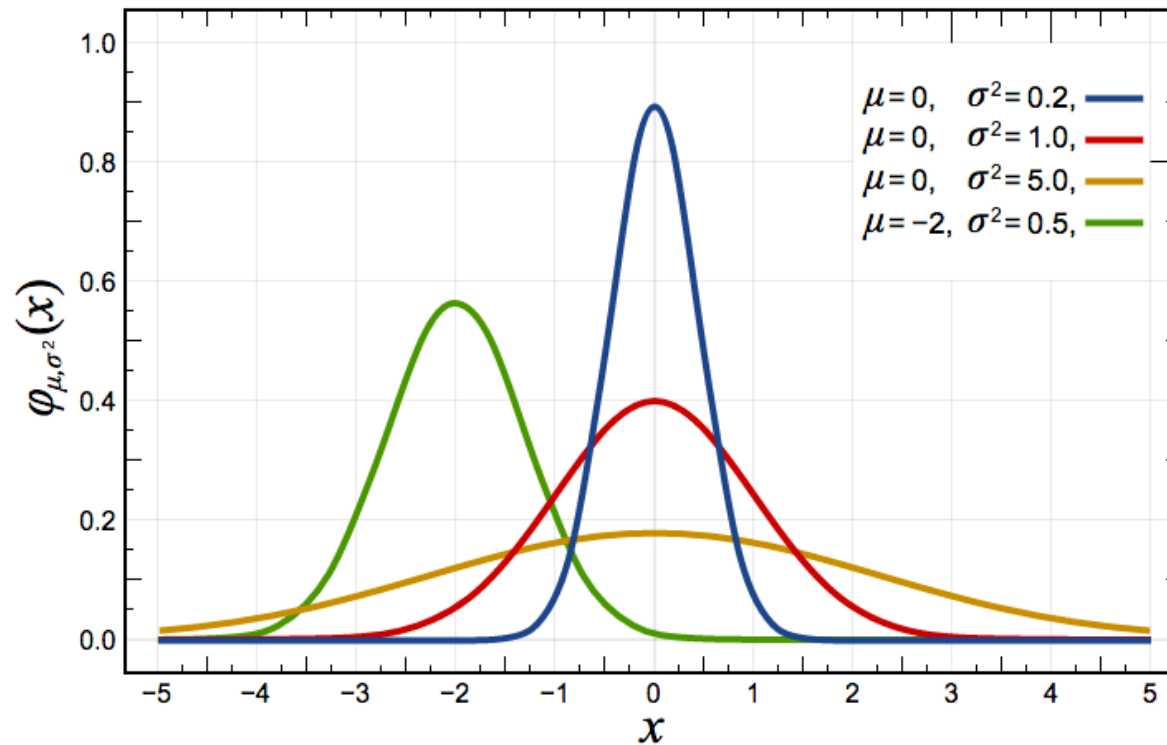
```
In [6]: # shorter:
plt.plot(X, C, 'b-', X, S, 'r-')
```

```
Out[6]: [<matplotlib.lines.Line2D at 0x112a09e90>,
<matplotlib.lines.Line2D at 0x112a160d0>]
```





Task: Reproduce plots





- High-level Library based on matplotlib
  - Themes
  - Color palettes
  - Plots (boxplots, histograms, heatmaps, ...)

```
sns.boxplot(data = X)
```

