**Announcements**

- **Exam 1 – Thursday, Feb. 26**.
  - Exams are in Lab, applied questions and theory.
  - During your regularly scheduled Thursday lab.
  - Friday lab – schedule a time for Thursday evening using the Doodle link on the website.
  - During exam you get: formula sheet; t-table; Excel functions.
- Course Notes at CDC – cost about $10.50.

I. Introduction
II. Statistical and Notational Preliminaries
  A. Introduction
  B. Elements of Statistical Theory
    1. Prerequisites: Summarizing distributions, point estimation, interval estimation, hypothesis testing.
    2. Bivariate measures: covariance and correlation.
    3. Expected Values.
    4. Estimators and Desirable Properties

### *3. Expected Values.*

a. Definition - The weighted sum of ***all possible values*** of a random variable; weights are probabilities.
b. Measure of ***central tendency – Population mean***.

$$E(Y) = \sum_{i=1}^{N} f_i Y_i = \sum_{i=1}^{N} Y_i P(Y_i) = \mu_Y$$

c. Rules for using Expected Values
d. Examples of Expected values: Sample Mean is Unbiased; Portfolio Expected Returns.
e. Other Expected Values: Variance and Covariance.

- Expected values or expected returns for X and Y:

  $E[X] = \mu_X = \$90$

  $E[Y] = \mu_Y = \$30.$
- Standard deviations and covariance:

  $\sigma_X = \$126.10$

  $\sigma_Y = \$\ 10.95$

  $\sigma_{XY} = \$\ -1300$

***PRS 2**:* Given the **Expected Returns *and* Risks** for X and Y, what weight would you choose for investment X in your portfolio?

1. 0.10
2. 0.30
3. 0.50
4. 0.70
5. 0.90

***PRS 3:*** Given ***your weights***, calculate E[P]. **Round to a whole dollar**.

$$E(P) = w_X\, E(X) + (1 - w_X)\, E(Y)$$

- ***Portfolio Risk*** – a portfolio of X and Y.

$$\sigma_P = \sqrt{w_X{}^2 \sigma_X^2 + (1-w_X)^2 \sigma_Y^2 + 2 w_X (1-w_X) \sigma_{XY}}$$

What are the parts? What's in this formula?

***PRS 4:*** Calculate ***portfolio risk*** for the weights you chose. Round to a whole dollar.

$$\sigma_P = \sqrt{w_X{}^2 \sigma_X^2 + (1-w_X)^2 \sigma_Y^2 + 2 w_X (1-w_X) \sigma_{XY}}$$

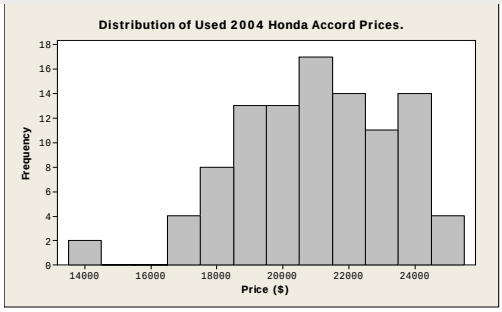
**PRS 5**: Cov(XY) will have it's greatest effect on portfolio risk when the weight on X ($w_X$) is:

1. 0.1
2. 0.2
3. 0.3
4. 0.4
5. 0.5
6. 0.6
7. 0.7
8. 0.8
9. 0.9

Univariate Data: Single random variable.

What's the mean?

What's the standard deviation?




## Basic Stats Review:

**Organization and presentation of data**:

- ✓ ***Arrays***
- ✓ ***Grouped Data Tables***
- ✓ ***Histograms***
- ✓ ***XY Scatter Diagrams***

**Estimation** – Univariate Measures.

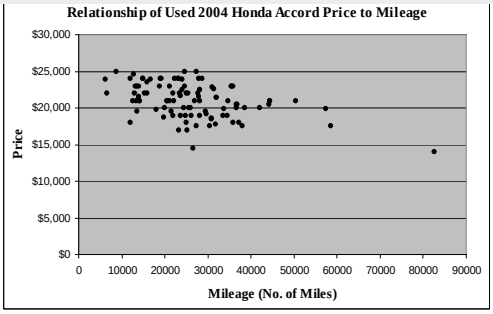
- ✓ ***Point Estimation***:
- ✓ ***Interval Estimation***:

- ✓ ***Hypothesis Testing:***

Bivariate Data: X and Y are assumed related.

Are X and Y linearly associated?

How closely associated are X and Y?



## Basic Stats Review:

**Estimation**: Bivariate Measures.

- ✓ ***Covariance:***
- ✓ ***Correlation:***

**Evaluating Estimators**:

- ✓ ***Desirable Properties*** –
- ✓ ***Expected Values*** –