

Statistics

Lecture 1



Feb 19-8:47 AM

Math 110 H Fridays 8:00 - 11:10 AM

Math Review

1) Simplify $\frac{120}{450} = \frac{12 \cdot \cancel{10}}{45 \cdot \cancel{10}} = \frac{\cancel{3} \cdot 4}{\cancel{3} \cdot 15} = \frac{4}{15}$

1) $\frac{4}{15}$

2) Write .5%.

a) in decimal

$$.5\% = .5(.01) = .005$$

2a) $.005$

b) in reduced fraction

$$.5\% = \frac{.5}{100} = \frac{5}{1000} = \frac{1}{200}$$

2b) $\frac{1}{200}$

Aug 30-8:08 AM

Scientific Notation

$$N \times 10^n$$

$1 \leq N < 10$ any integer

2.75×10^8 (Large)
 8.5×10^{-4} (Small)

$2.75 \times 10^8 = 2.75 \underbrace{00000000}_{8 \text{ zeros}} = 275,000,000$

$0.00085 = 8.5 \times 10^{-4}$

In a survey of 175 students, 2.5% of them were smokers. How many were smokers?

what is 2.5% of 175? Round up to a whole #

$$x = 2.5\% (175)$$

$$= .025 (175)$$

$$= 4.375 \approx \boxed{5}$$

Aug 30-8:15 AM

125 of 400 students had a part-time job.
 what % of them had part-time job?
 125 is what percent of 400?

$$125 = \frac{P}{100} \cdot 400$$

$$125 = 4P$$

$$\frac{125}{4} = P$$

$$31.25 = P$$

Round to 1-decimal

$$31.3\%$$

Round to whole% → 31%

$\boxed{31.25\%}$

Aug 30-8:22 AM

80) Use Your Calc. to Find

$$\frac{10(640) - 80^2}{10(10-1)}$$

$$= \frac{6400 - 6400}{10 \cdot 9} = \frac{0}{90} = \boxed{0}$$

Do not use \emptyset for 0.
 NO Solution undefined
 Zero

80) 0
 ↳ Empty Set

Use Your Calc to Simplify

$$1.645 \cdot \sqrt{\frac{(.8)(.2)}{100}}$$

$$= 1.645 \cdot \sqrt{\frac{.16}{100}} = 1.645 \cdot \frac{.4}{10}$$

$$= 1.645 \cdot (.04)$$

$$= \boxed{.0658}$$

Round to

1-decimal	.1
2-decimal	.07
3-decimal	.066

Aug 30-8:26 AM

! Factorial

$0! = 1$ $n! = n(n-1)(n-2)(n-3) \dots 3 \cdot 2 \cdot 1$

$1! = 1$ $6! = 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1$
 $= \boxed{720}$

$2! = 2 \cdot 1$

$3! = 3 \cdot 2 \cdot 1$

$4! = 4 \cdot 3 \cdot 2 \cdot 1$ $\frac{8!}{6!} = \frac{8 \cdot \cancel{7} \cdot \cancel{6} \cdot \cancel{5} \cdot \cancel{4} \cdot \cancel{3} \cdot \cancel{2} \cdot \cancel{1}}{\cancel{6} \cdot \cancel{5} \cdot \cancel{4} \cdot \cancel{3} \cdot \cancel{2} \cdot \cancel{1}}$
 $= \boxed{56}$

Simplify

$$\frac{5! - 4!}{3!} = \frac{120 - 24}{6} = \frac{96}{6} = \boxed{16}$$

Aug 30-8:33 AM

Given $y = 6x - 15$

1) Find y if $x = -2$

$$y = 6(-2) - 15 = -12 - 15 = \boxed{-27}$$

2) Find x when $y = 15$.

$$15 = 6x - 15$$

$$15 + 15 = 6x$$

$$6x = 30$$

$$\boxed{x = 5}$$

Aug 30-8:41 AM

Graph

$$2x - 5y = -10$$

Linear eqn in 2 variables

x	y
0	2
-5	0

Isolate y

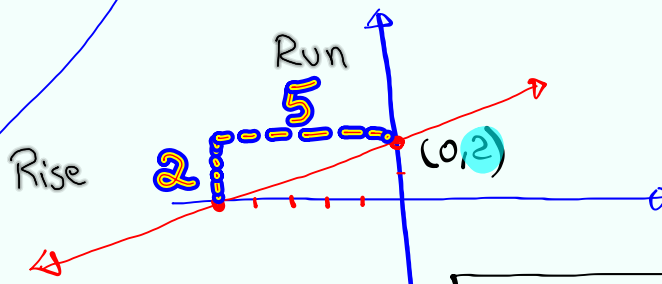
$$2x - 5y = -10$$

$$-5y = -2x - 10$$

$$y = \frac{-2}{-5}x - \frac{10}{-5}$$

$$y = \frac{2}{5}x + 2$$

Slope-Int Form
 $y = mx + b$



Aug 30-8:44 AM

Plot $A(0, -2)$ and $B(4, -5)$
 Draw the line \overleftrightarrow{AB}

Find its equation

$m = \frac{-3}{4}$ Y-Int $(0, -2)$

$y = \frac{-3}{4}x - 2$

Aug 30-8:49 AM

In a class of 18 students.

10 had iPhone
 4 had iPad.
 3 had iPhone and iPad.

Make a Venn Diagram

$10 - 3 = 7$, $4 - 3 = 1$

S & I

Aug 30-8:55 AM

What is statistics?

SG 2

It is about collecting information (Data),
organize them, graph them, do certain
calculations and draw conclusion.

Two Branches:

1) Descriptive

Collect data, organize, graph, do Calculations

2) Inferential

when we draw conclusion and
make predictions with some level
of confidence.

Aug 30-9:16 AM

Randomly selected data \rightarrow Sample (Randomly Selection)

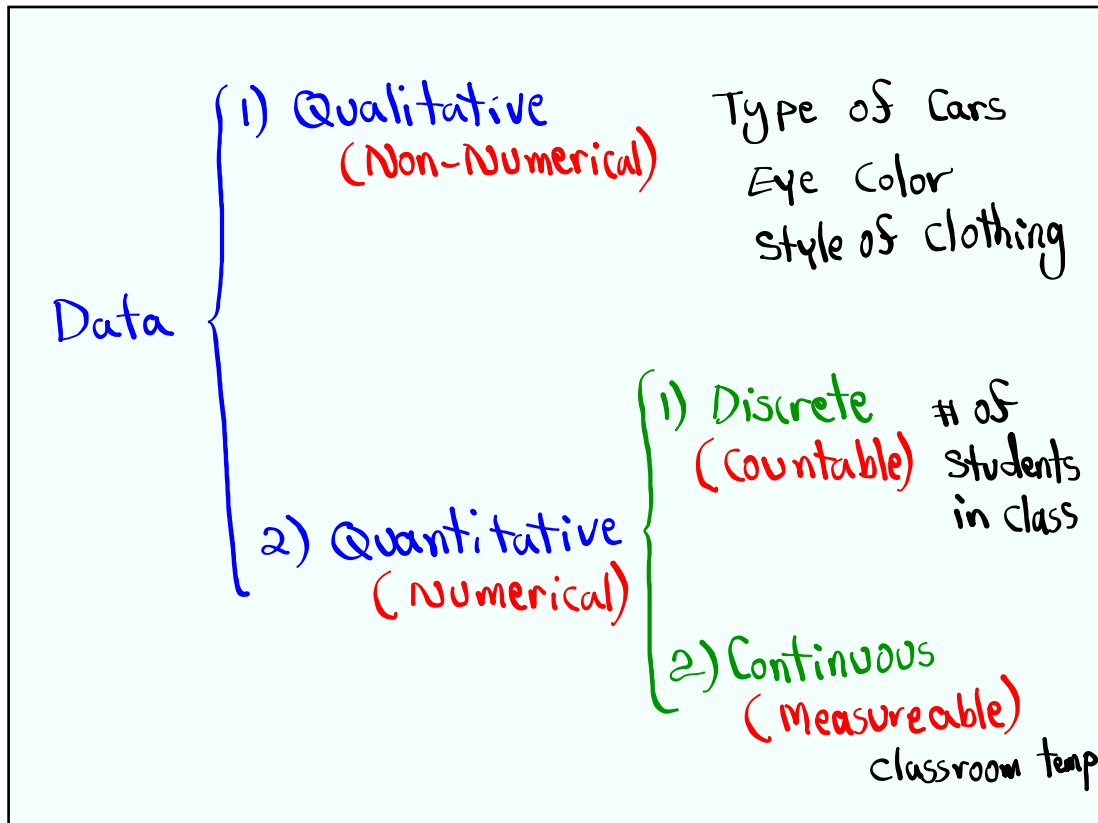
Entire field of interest \rightarrow population (All, every)

We work with samples to
learn about populations.

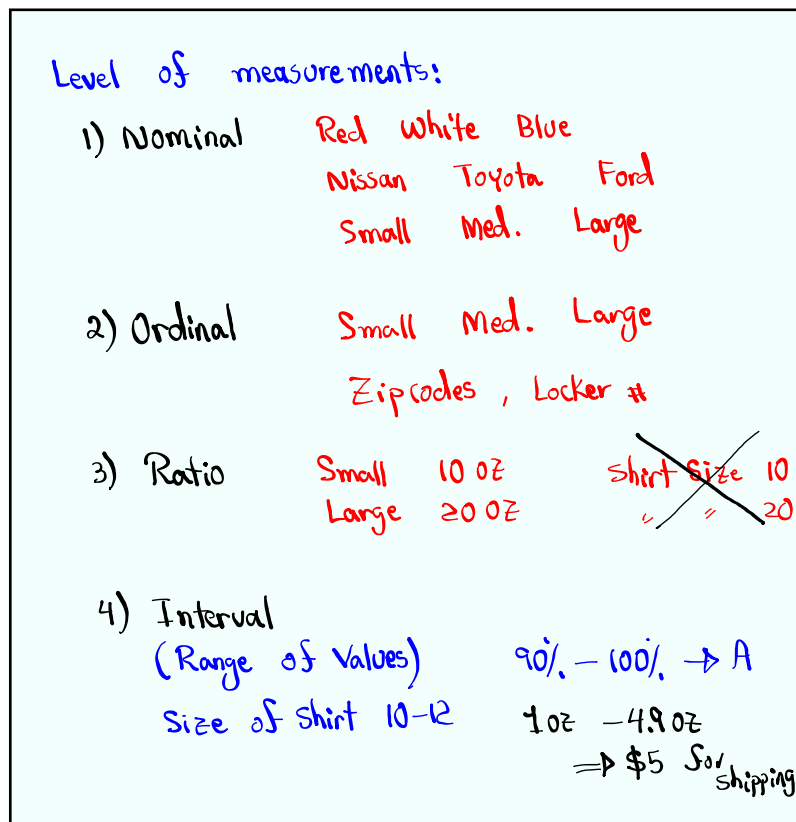
Sample \leftrightarrow Statistic

Population \leftrightarrow Parameter

Aug 30-9:21 AM



Aug 30-9:25 AM



Aug 30-9:30 AM

How to collect data (Sampling Methods):

1) Systematic

Every k th item Selected.

Every 5th caller, call be recorded.

Assembly line \Rightarrow Every 10th item selected for inspection.

2) Stratified

Divide into groups,

Select few from each group

18 students $\left\{ \begin{array}{l} 10 \text{ Females (Select 4)} \\ 8 \text{ males (Select 3)} \end{array} \right.$

Cal poly Pomona $\left\{ \begin{array}{l} \text{Freshmen (100)} \\ \text{Soph. (150)} \\ \text{Jr. (75)} \\ \text{Sr. (25)} \\ \text{Graduate students (50)} \end{array} \right.$

Aug 30-9:38 AM

3) cluster

Divide into groups

Select few groups

Collect data from all members of selected groups.

College offers 2000 sections of classes.

We select 50 classes randomly.

Ask all students to do survey in these selected classes.

4) Random / Convenience.

"Least reliable Method"

Aug 30-9:46 AM

Experiment vs Observation

Observe changes
due to
action taken

Observe without taking
any action.

Simple Random Sample

All items have same chance of being selected

SG 2 ✓

Aug 30-9:53 AM

Consider the Sample below

1 2 2 2 5

1) Sample Size $n=5$

2) Range = Max - Min = $5 - 1 = 4$

3) Midrange = $\frac{\text{Max} + \text{Min}}{2} = \frac{5+1}{2} = 3$

4) Mode 2

5) $\sum x = 1 + 2 + 2 + 2 + 5 = 12$
 ↑
 Summation data element

6) $\sum x^2 = 1^2 + 2^2 + 2^2 + 2^2 + 5^2 = 38$

7) Simplify $\frac{n\sum x^2 - (\sum x)^2}{n(n-1)} = \frac{5 \cdot 38 - 12^2}{5(5-1)}$

8) $\sqrt{\text{last ans.}} = \sqrt{2.3} = \frac{190-144}{5 \cdot 4} = \frac{46}{20} = 2.3$
 ≈ 1.517

Aug 30-10:17 AM

Consider the Sample below

0 3 3 3 5 5 5 10

$$10 + 0 \div 2 = 10$$

$$(10 + 0) \div 2 = 5$$

1) $n = 8$

3) Midrange = $\frac{\text{Max} + \text{Min}}{2}$
 $= \frac{10 + 0}{2} = 5$

2) Range = Max - Min
 $= 10 - 0 = 10$

4) Mode $3 \neq 5$
 Bimodal

5) $\sum x = 0 + 3 + 3 + 3 + 5 + 5 + 5 + 10 = 34$

6) $\sum x^2 = 0^2 + 3^2 + 3^2 + 3^2 + 5^2 + 5^2 + 5^2 + 10^2 = 202$

7) Simplify $\frac{n \sum x^2 - (\sum x)^2}{n(n-1)} = \frac{8 \cdot 202 - 34^2}{8(8-1)} = \frac{460}{56} \approx 8.214$

8) $\sqrt{\text{Last ans.}} = \sqrt{8.214} \approx 2.866$
 whole 3
 1-dec. 2.9
 2-dec. 2.87

Aug 30-10:27 AM

a) Divide Range by 3,

If decimal \rightarrow Round-up to a whole #

If whole \rightarrow Add 1

$$\frac{10}{3} = 3.\bar{3} \rightarrow 4$$

a) Divide Range by 5,

If decimal \rightarrow Round-up to a whole #

If whole \rightarrow Add 1

$$\frac{10}{5} = 2 \rightarrow 3$$

Aug 30-10:40 AM

A Sample has a min. of 15 and
a max of 55.

$$\begin{aligned} 1) \text{ Range} &= \text{Max} - \text{Min} \\ &= 55 - 15 \\ &= \boxed{40} \end{aligned}$$

$$\begin{aligned} 2) \text{ Midrange} &= \frac{\text{Max} + \text{Min}}{2} \\ &= \frac{55 + 15}{2} = \boxed{35} \end{aligned}$$

3) $\frac{\text{Range}}{3}$, if decimal \rightarrow Round-up
if whole \rightarrow Add 1

$$\frac{40}{3} = 13.\bar{3} \quad \boxed{14}$$

4) $\frac{\text{Range}}{4}$, if decimal \rightarrow Round-up
if whole \rightarrow Add 1

$$\frac{40}{4} = 10 \quad \boxed{11}$$

Aug 30-10:43 AM