

# Statistics

## Lecture 1



Feb 19-8:47 AM

### Basic Math Review

1) Simplify  $\frac{75}{120} = \frac{\cancel{3} \cdot 25}{\cancel{3} \cdot 40} = \frac{5 \cdot 5}{5 \cdot 8} = \boxed{\frac{5}{8}}$

1)  $\frac{5}{8}$

2) write .2% in

a) Reduced fraction

$$.2\% = \frac{.2}{100} = \frac{.2(10)}{100(10)} = \frac{2}{1000} = \boxed{\frac{1}{500}}$$

a)  $\frac{1}{500}$

b) decimal

$$.2\% = .2(.01) = \boxed{.002}$$

b)  $.002$

3) write .00000075 in Scientific notation.

$$N \times 10^n$$

↑

$$1 \leq N < 10$$

$$\boxed{7.5 \times 10^{-7}}$$

3)  $7.5 \times 10^{-7}$

Jun 24-4:49 PM

- 4) I selected 275 students and  
8% of them were left-handed.

How many were left-handed?

If decimal, Round-up.

What is 8% of 275?

$$x = .08(275) = \boxed{22} \quad 4) \underline{22}$$

- 5) 18 of 75 students were smokers.

What Percent of them were smokers?

18 is what % of 75?

$$18 = \frac{P}{100} \cdot 75 \quad \rightarrow \quad P = \frac{18}{.75}$$

$$18 = .75 P$$

$$P = 24$$

$$5) \underline{24\%}$$

Jun 24-4:57 PM

Use Your Calc. to Find

$$1) \frac{10(625) - 25^2}{20} = \frac{6250 - 625}{20} = \frac{5625}{20} = 281.25$$

Round to  
whole

Ans  
281

$$2) \frac{45 - 33}{\frac{8}{\sqrt{16}}}$$

$$= \frac{12}{\frac{8}{4}} = \frac{12}{2} = \boxed{6}$$

1-dec.

281.3

$$3) 1.645 \cdot \sqrt{\frac{(.2)(.8)}{25}} = 1.645 \cdot \sqrt{\frac{.16}{25}}$$

$$= 1.645 \cdot \frac{.4}{5} = .1316$$

Round to

1-dec.

.1

2-dec.

.13

3-dec.

.132

Jun 24-5:04 PM

! Factorial

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

$$0! = 1, \quad 1! = 1$$

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

$$5! = 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 = 120$$

Do not  
write Zero

∅

Simplify

$$\frac{8!}{2! \cdot 6!} = \frac{\cancel{8} \cdot \cancel{7} \cdot \cancel{6} \cdot \cancel{5} \cdot \cancel{4} \cdot \cancel{3} \cdot \cancel{2} \cdot \cancel{1}}{\cancel{2} \cdot \cancel{1} \cdot \cancel{6} \cdot \cancel{5} \cdot \cancel{4} \cdot \cancel{3} \cdot \cancel{2} \cdot \cancel{1}} = \frac{28}{1} = \boxed{28}$$

Jun 24-5:11 PM

Given  $y = 4x - 60$

1) Find  $y$  when  $x = 15$ .

$$y = 4(15) - 60 = 60 - 60 = \boxed{0}$$

Zero  
Not  
∅

2) Find  $x$  when  $y = 60$ .

$$60 = 4x - 60$$

$$60 + 60 = 4x$$

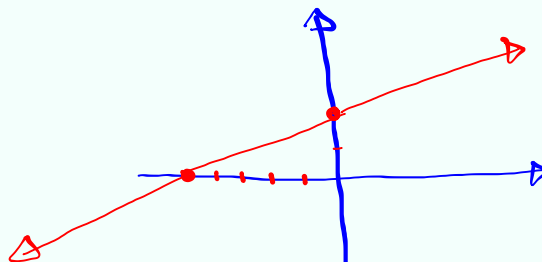
$$120 = 4x$$

$$x = \frac{120}{4} \quad \boxed{x=30}$$

Jun 24-5:16 PM

Graph  $2x - 5y = -10$

$x$	$y$
0	2
-5	0



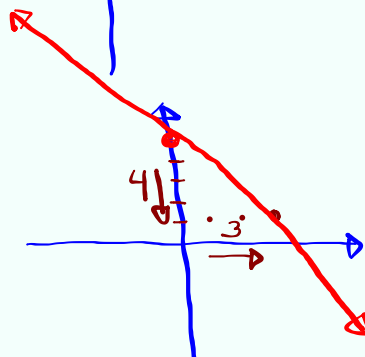
Graph  $y = -\frac{4}{3}x + 5$

Slope-Int  
Form

$$y = mx + b$$

$$y\text{-Int } (0, 5)$$

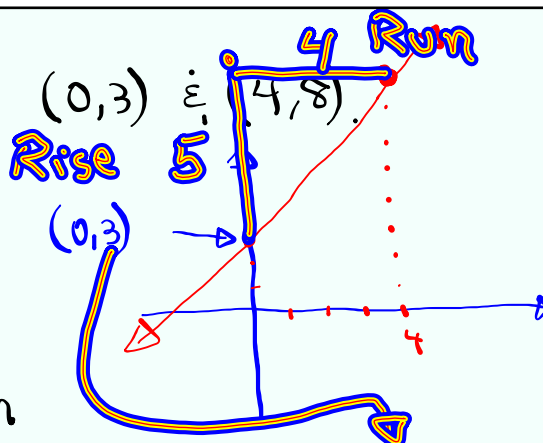
$$m = -\frac{4}{3}$$



Jun 24-5:20 PM

A line contains  $(0, 3)$  and  $(4, 8)$ .

1) Draw it.



2) Find its eqn in  
Slope-Int. Form.

$$y = mx + b$$

$$y = \frac{5}{4}x + 3$$

Jun 24-5:27 PM



I Surveyed 50 Students.

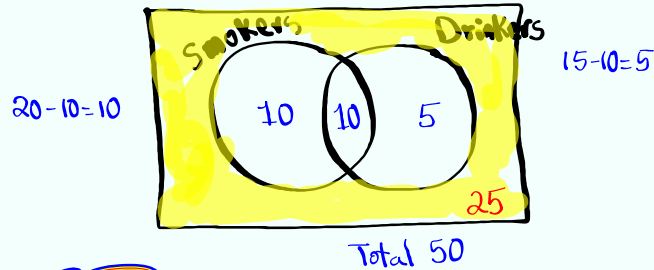
20 were Smokers.

15 were drinkers.

10 were Smokers and drinkers.

Construct a Venn Diagram.

one way to organize data.



SG 1

Jun 24-5:33 PM

Language of Statistics:

SG 2

what is statistic?

It is about collecting data and draw conclusion from it.

Two Branches

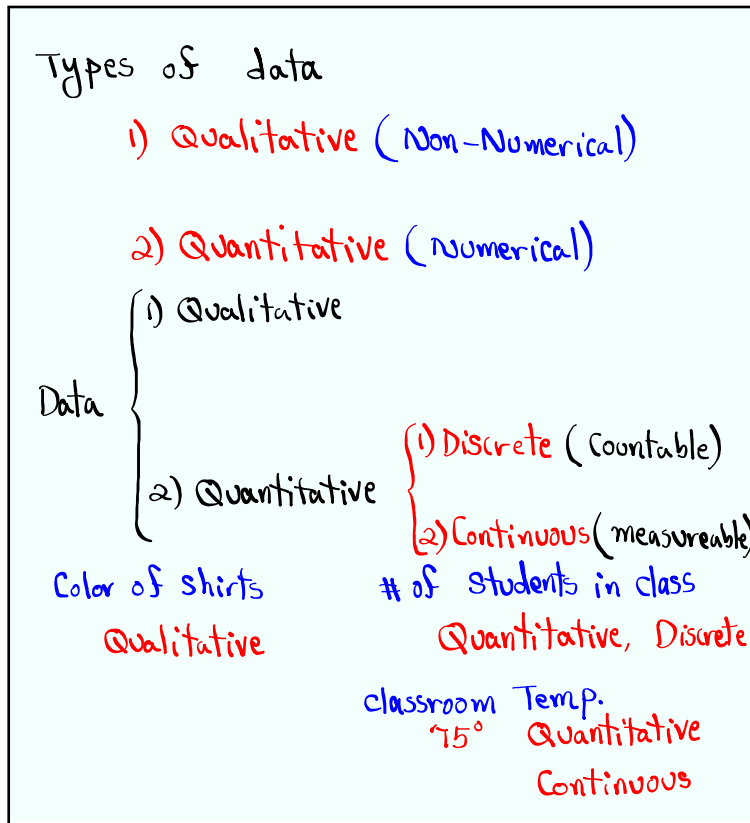
1) Descriptive

collect data, organize it, do certain computations and drawing.

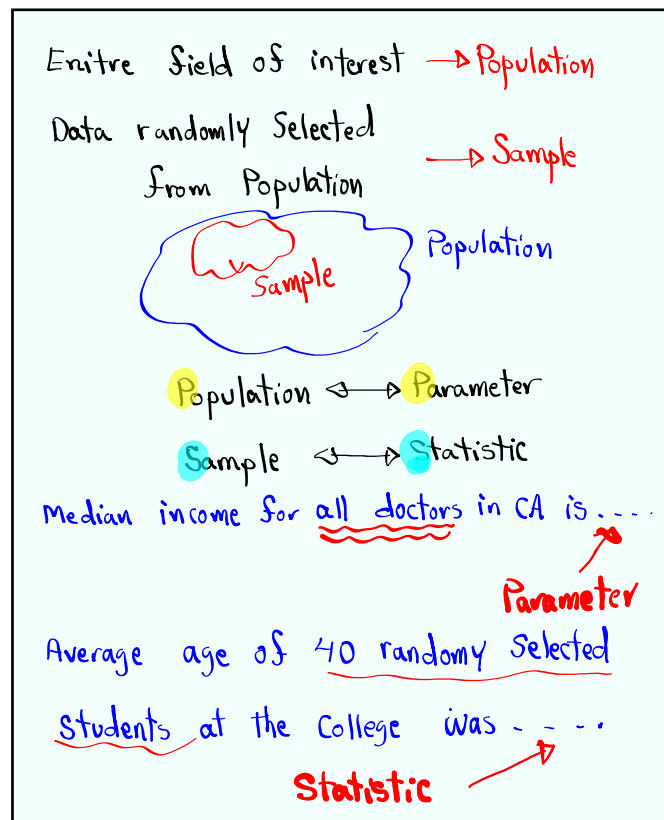
2) Inferential

Draw conclusion from data to make predictions.

Jun 24-6:00 PM



Jun 24-6:04 PM



Jun 24-6:09 PM

## Level of measurements:

- 1) **Nominal** → Names, order is not meaningful.  
Red, white, Black, Blue
- 2) **ordinal** → Names, order is meaningful.  
Small, Medium, Large, xlarge
- 3) **Ratio** → meaningful ratio
- 4) **Interval** Small (12 oz) Large (24 oz)  
Large is twice Small.  
→ Range of Values  
90% - 100% ⇒ A  
12 oz → 10 oz - 19.9 oz → \$3 Stamp

Jun 24-6:15 PM

## Methods on Collecting Data:

- 1) **Systematic** every Kth item selected
- 2) **Stratified** divide into groups  
Select few from every group  
Males & Females  
4 6
- 3) **cluster** Divide into groups  
Select some of groups  
Collect data from all members of selected groups.  
College offers 100 sections of math classes this semester  
Randomly Select 20 Sections  
Ask students from these sections to do a survey.
- 4) **Random or Convenience**  
Least reliable method

Jun 24-6:22 PM

# Observation Vs Experiment

You observe  
changes without  
any action taken

You noticed heavy  
traffic after rain.

You take actions  
and observe  
changes.

You take certain  
medicine for  
blood sugar level.

SG 2 ✓

Jun 24-6:33 PM

I randomly selected 8 quizzes. Here are  
the Scores

2 3 5 5 5 7 8 10

Min = 2

Max = 10

Sample  
Size  $n=8$

$$\text{Range} = \text{Max} - \text{Min} = 10 - 2 = 8$$

$$\text{Midrange} = \frac{\text{Max} + \text{Min}}{2} = \frac{10 + 2}{2} = 6$$

I used my Calc

$$(10 + 2) \div 2 \rightarrow 11 \quad \text{X}$$

$$\sum x = 2 + 3 + 5 + 5 + 5 + 7 + 8 + 10$$

$$\text{Summation of } x = 45$$

$$\sum x^2 = 2^2 + 3^2 + 5^2 + 5^2 + 5^2 + 7^2 + 8^2 + 10^2$$

Square every  $x$   
then add

$$= 301$$

Jun 24-6:38 PM

Find  $\frac{\sum x}{n} = \frac{45}{8} = 5.625$

Find  $\frac{n \sum x^2 - (\sum x)^2}{n(n-1)} = \frac{8 \cdot 301 - 45^2}{8(8-1)}$

$$= \frac{2408 - 2025}{8 \cdot 7} = \frac{383}{56}$$

$$\approx 6.839$$

What is the mode?

Data that appears the most.

5

Jun 24-6:45 PM

Making a Freq. Table to organize data

class limits	class BNDRS	class MP	class F.	Cum. F.	Rel. F.	%F

Draw some statistical graphs

1) Bar chart

4) Freq. Poly gon

2) Histogram

5) Pie chart

3) Ogive

6) Stem Plot

7) Box Plot

Jun 24-6:49 PM

I randomly Selected 20 students, here are their ages:

18 20 20 24 26 1)  $n = 20$

28 28 28 30 32 2) Min = 18  
Max = 50

32 32 35 37 38 3) Range =  $50 - 18 = 32$

40 42 45 50 50 4) Midrange =  $\frac{50 + 18}{2} = 34$  5) Mode 28 & 32

Bimodal

I want to make a freq. table with 3 classes.

class width =  $\frac{\text{Range}}{\# \text{ classes}}$

If decimal  $\rightarrow$  Round-up

If whole  $\rightarrow$  Add 1

$CW = \frac{\text{Range} = 32}{3} = 10.66 \dots$

$CW = 11$

Jun 24-6:54 PM

Min

Class limits	class BNDRS	Class MP	Class F	Cum. F	Rel. F	% F
18 - 28	17.5 - 28.5	23	8	8	.40	40%
29 - 39	28.5 - 39.5	34	7	15	.35	35%
40 - 50	39.5 - 50.5	45	5	20	.25	25%

$n = 20$

class MP =  $\frac{\text{class limits}}{2}$

Rel. F =  $\frac{f}{n} = \frac{?}{20}$  , % F = Rel. F (100)

Jun 24-7:02 PM