

Statistics

Lecture 1



Feb 19-8:47 AM

Basic Math Review:

(S&I)

1) Reduce $\frac{45}{120}$

$$\frac{45}{120} = \frac{\cancel{3} \cdot 15}{\cancel{3} \cdot 40} = \frac{\cancel{5} \cdot 3}{\cancel{5} \cdot 8} = \boxed{\frac{3}{8}}$$

1) $\frac{3}{8}$

2) Write .4% in

a) Decimal

$$.4\% = .4(.01) = \boxed{.004}$$

2a) $.004$

b) Reduced Fraction

2b) $\frac{1}{250}$

$$.4\% = .4\left(\frac{1}{100}\right) = \frac{\cancel{4}}{10} \cdot \frac{1}{\cancel{100}_{25}} = \boxed{\frac{1}{250}}$$

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I did a survey of 75 students and
6% of them were left-handed.

How many of them were left-handed?

what is $\boxed{6\% \text{ of } 75?}$

$$x = .06 \cdot (75) = 4.5 \quad \text{about } \underline{5}$$

Round up to $\boxed{5}$

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! Factorial

$$5! = 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 = \boxed{120}$$

$$0! = 1$$

$$8! - 6! =$$

$$1! = 1$$

$$8 \cdot 7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 -$$

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

$$6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 =$$

$$3! = 3 \cdot 2 \cdot 1 = 6$$

$$40320 - 720 = \boxed{39600}$$

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

$$\text{Reduce } \frac{8!}{4!} = \frac{\cancel{8} \cdot \cancel{7} \cdot \cancel{6} \cdot \cancel{5} \cdot \cancel{4} \cdot \cancel{3} \cdot \cancel{2} \cdot 1}{\cancel{4} \cdot \cancel{3} \cdot \cancel{2} \cdot 1} = \boxed{1680}$$

$$\text{Reduce } \frac{9!}{6! \cdot 3!} = \frac{\overset{3}{\cancel{9}} \cdot \overset{4}{\cancel{8}} \cdot \cancel{7} \cdot \cancel{6!}}{\cancel{6!} \cdot \cancel{3} \cdot \cancel{2} \cdot 1} = \frac{3 \cdot 4 \cdot 7}{1} = \boxed{84}$$

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Scientific Notation $N \times 10^n$

$1 \leq N < 10$ any integer

$2.5 \times 10^6 = 2.5 \underbrace{000000}_{6 \text{ Zeros}} = \boxed{2,500,000}$

$3.75 \times 10^{-4} = 0.0003.75 = \boxed{0.000375}$

left 4 times optional

write

$0.\underbrace{0000000000008}_{11 \text{ times}}6 = \boxed{8.6 \times 10^{-11}}$

decimal Point

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use your calc to simplify

$$\frac{75 - 60}{\frac{8}{\sqrt{25}}} = \frac{15}{\frac{8}{5}} = \frac{15}{1.6} = 9.375$$

Round to

- whole # $\boxed{9}$
- 1-Decimal $\boxed{9.4}$
- 2-Decimal $\boxed{9.38}$

use your calc to simplify

$$2.575 \cdot \sqrt{\frac{(62)(8)}{100}} = 2.575 \cdot \sqrt{\frac{.16}{100}}$$

$$= 2.575 \cdot \frac{.4}{10}$$

$$= 2.575 (.04)$$

$$= \boxed{.103}$$

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A standard deck of playing cards has 52 cards, 26 Red, 12 face, and 4 Aces.

what percent of the cards are face or ace?

16 is what % of 52?

$$16 = \frac{P}{100} \cdot 52 \quad \text{Find } P.$$

$$16 = .52 P$$

$$\frac{16}{.52} = P$$

$$P = 30.76923077$$

whole % 31%

$P \approx 31$

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Suppose $y = 4.5x - 36$

Find y when x is 8.

$$y = 4.5(8) - 36 = 36 - 36 = \boxed{0}$$

Do not
use $\emptyset$
for Zero.

Find x when y is -18.

$$-18 = 4.5x - 36$$

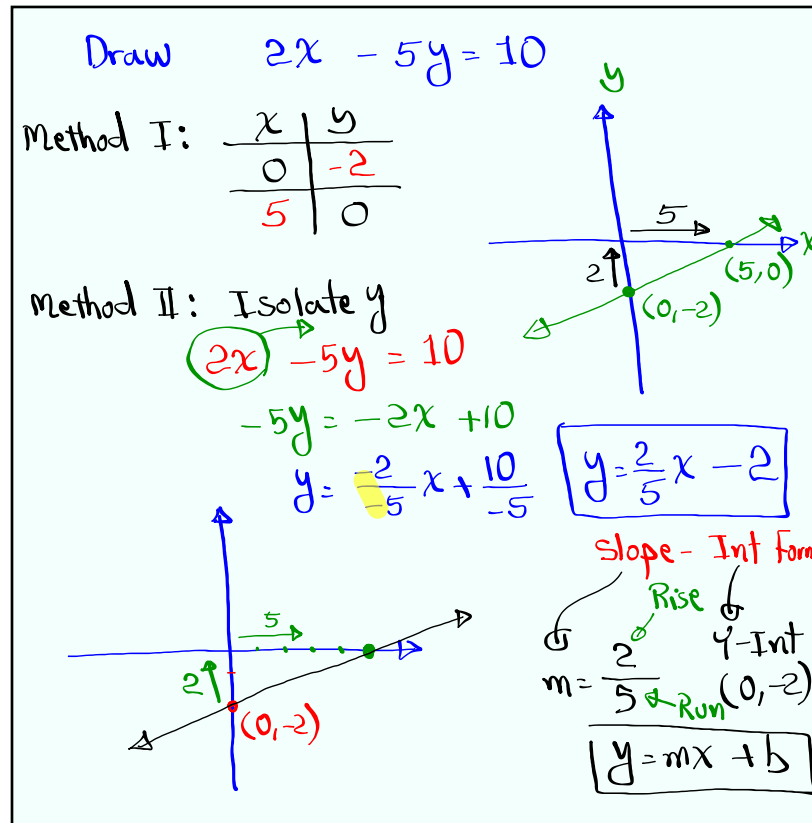
$$-18 + 36 = 4.5x$$

$$18 = 4.5x$$

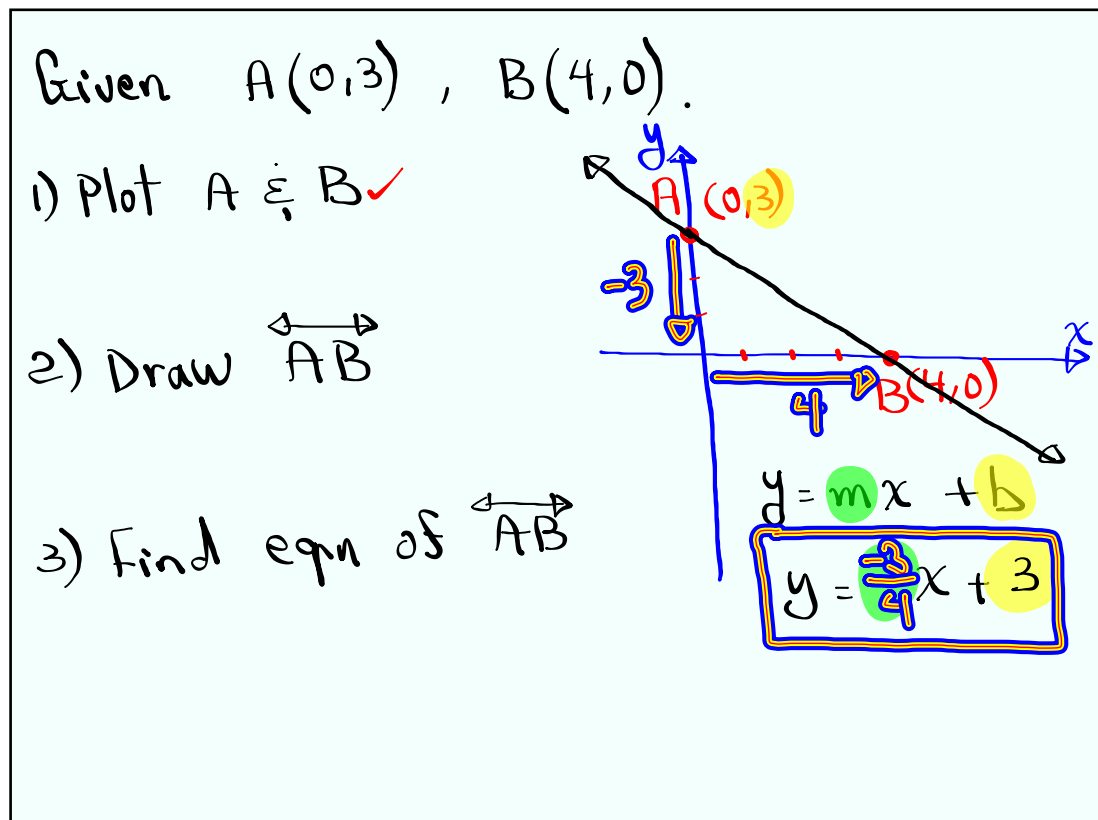
$$\frac{18}{4.5} = x$$

$$\boxed{x = 4}$$

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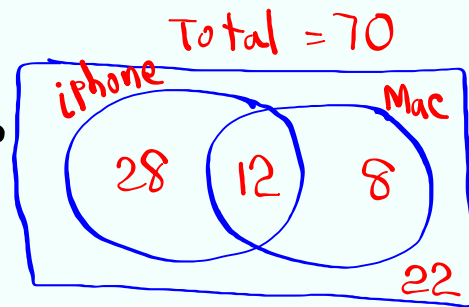
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I surveyed 70 students.

40 had iPhone

20 = Macbook laptop

12 = both. overlap



Construct Venn Diagram.

$$40 - 12 = 28$$

$$20 - 12 = 8$$

SG 1

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Language of statistics:

SG 2

what is statistics?

It is about collecting information (data),
organize them, graph them, do certain
computations and draw conclusions.

Two branches

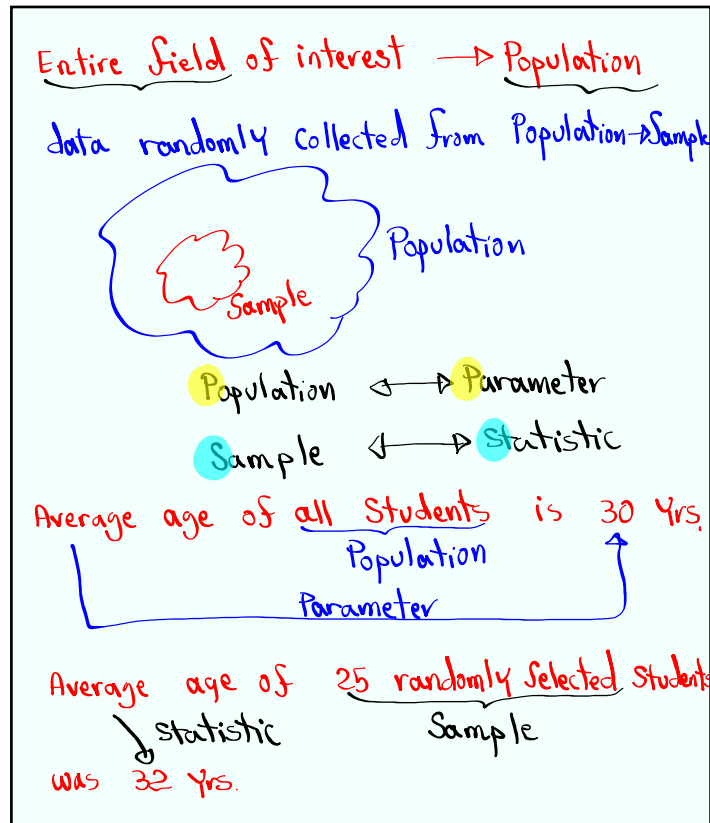
1) Descriptive

Collect data, organize, graph and
computation

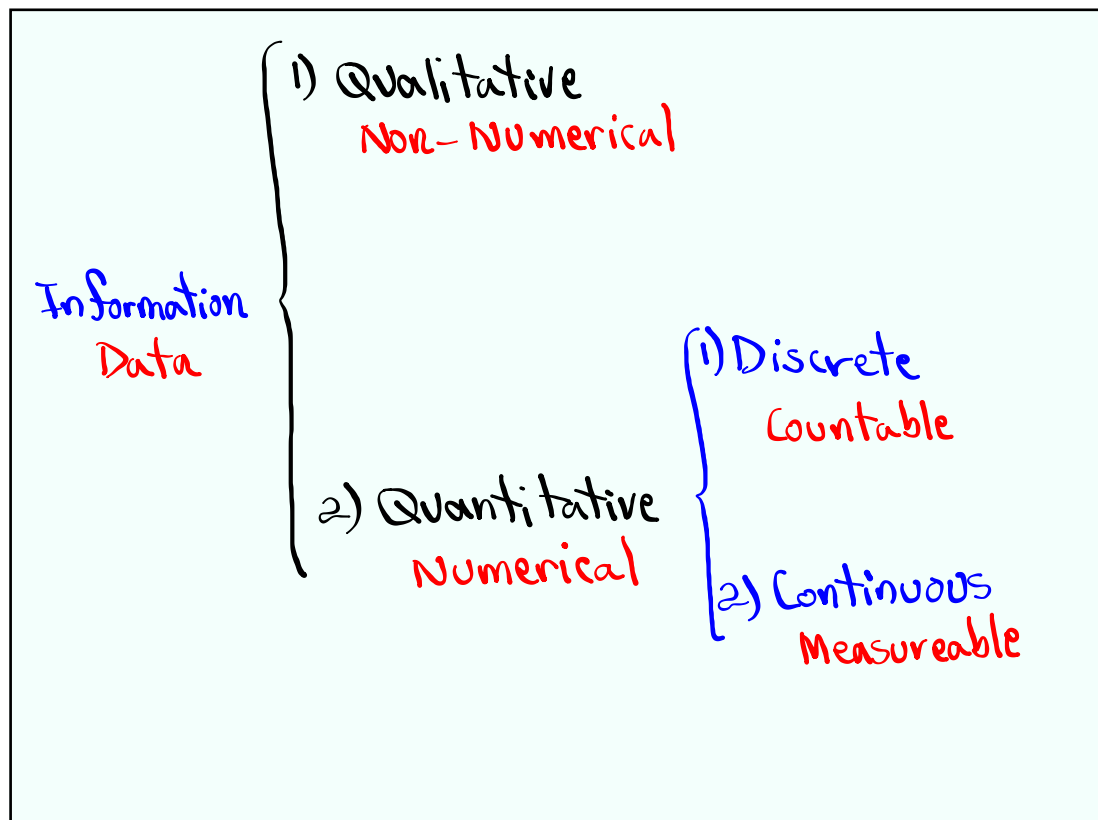
2) Inferential

Draw conclusion with some
degree of confidence and
make predictions

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Level of measurements

- 1) Nominal Red, white, Blue
Toyota, Nissan, Honda, Ford
- 2) ordinal Small, Med, Large
Size of Shirts
- 3) Ratio

	10	20	30	40
Small	100%			
Large		200%		

 → 1 to 2
- 4) Interval Range of Values
90-100 → A

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How to collect data: Sampling Method

- 1) Systematic every Kth item Selected
- 2) Stratified Divide into groups
Select few from each group
- 3) cluster Divide into groups
Select few groups
Collect data from all members of selected groups
- 4) Random/ Convenience
Least reliable method

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observation vs Experiment

You observe
changes without
any action taken

You take actions
and look for
changes

Simple Random Sample

Every data element has same
chance of being taken.

A deck of cards with 52 cards,
chance of selecting any cards is
the same for all of them.

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A data set has a minimum value of
20 and maximum value of 100.

Min. = 20, Max. = 100

Find

$$1) \text{ Max} - \text{Min} = 100 - 20 = \boxed{80}$$

$$2) \frac{\text{Max} + \text{Min}}{2} = \frac{100 + 20}{2} = \frac{120}{2} = \boxed{60}$$

$(100 + 20) \div 2 = 110$ (crossed out with a green arrow pointing to the correct result)

$$3) \frac{\text{Max} - \text{Min}}{4} = \frac{100 - 20}{4} = \frac{80}{4} = \boxed{20}$$

$$4) \frac{(\text{Max} - \text{Min})^2}{10} = \frac{(100 - 20)^2}{10} = \frac{80^2}{10} = \frac{6400}{10} = \boxed{640}$$

Ex 2

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Consider the Sample below

2, 3, 3, 5, 7

1) Sample Size $n=5$

2) Range = Max - Min = $7 - 2 = 5$

3) Midrange = $\frac{\text{Max} + \text{Min}}{2} = \frac{7 + 2}{2} = \frac{9}{2} = 4.5$

4) $\sum x = 2 + 3 + 3 + 5 + 7 = 20$ ✓
 ↑
 Summation data elements

5) $\sum x^2 = 2^2 + 3^2 + 3^2 + 5^2 + 7^2 = 96$

6) $\frac{\sum x}{n} = \frac{20}{5} = 4$

7) $\frac{n \sum x^2 - (\sum x)^2}{n(n-1)}$
 $= \frac{5 \cdot 96 - 20^2}{5(5-1)}$
 $= \frac{80}{20} = 4$

8) $\sqrt{\text{Last Ans.}} = \sqrt{4} = 2$

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