

Statistics

Lecture 1



Feb 19-8:47 AM

Some Basic Math Review:

1) Reduce $\frac{25}{120}$

$$\frac{25}{120} = \frac{\cancel{5} \cdot 5}{\cancel{5} \cdot 24} = \boxed{\frac{5}{24}}$$

1) $\frac{5}{24}$

2) write .004 in

a) Reduced fraction

$$.004 = \frac{4}{1000} = \frac{2}{500} = \boxed{\frac{1}{250}} \quad \text{2a) } \frac{1}{250}$$

b) Percent notation

$$.004 = .004(100\%) = \boxed{.4\%} \quad \text{2b) } .4\%$$

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3) 7.5% of 120 selected students were left-handed.

a) what % were not left-handed?

$$100\% - 7.5\% = \boxed{92.5\%} \quad \text{3a) } \underline{92.5\%}$$

b) How many were left-handed?

7.5% of 120

$$7.5\% \cdot 120 = .075(120)$$

$$= \boxed{9}$$

$$\text{3b) } \underline{9}$$

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use your calc to find

$$\frac{72 - 60}{\frac{10}{\sqrt{25}}} = \frac{12}{\frac{10}{5}} = \frac{12}{2} = \boxed{6}$$

$$\begin{aligned} 1.96 \cdot \sqrt{\frac{(.2)(.8)}{100}} &= 1.96 \cdot \sqrt{\frac{.16}{100}} \\ &= 1.96 \cdot \frac{.4}{10} \\ &= 1.96(.04) = \boxed{.0784} \end{aligned}$$

Round to

1 - dec. .1

2 - dec. .08

3 - dec. .078

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

what % of them are face or aces?
16 cards

16 is what % of 52?

$$16 = \frac{p}{100} \cdot 52$$

Multiply by 100

$$1600 = 52p$$

Divide by 52

$$\frac{1600}{52} = p$$

$$p = 30.769$$

whole %

31%

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Scientific Notation

$$N \times 10^n$$

$$1 \leq N < 10$$

any integer

$$2.5 \times 10^4 = 2.50000 = \boxed{25000}$$

$$8.39 \times 10^{-6} = 0.00000839 = \boxed{0.00000839}$$

$$475000000000000 = \boxed{4.75 \times 10^{14}}$$

optional

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! Factorial

$$0! = 1$$

$$1! = 1$$

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

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

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

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

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

$$= 40320 - 120$$

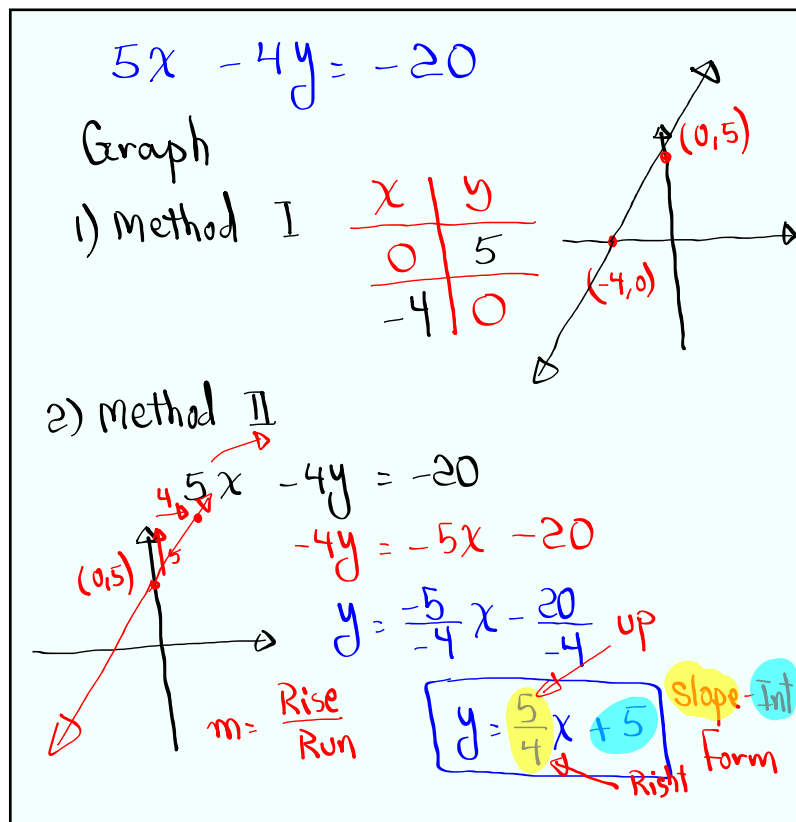
$$= \boxed{40200}$$

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

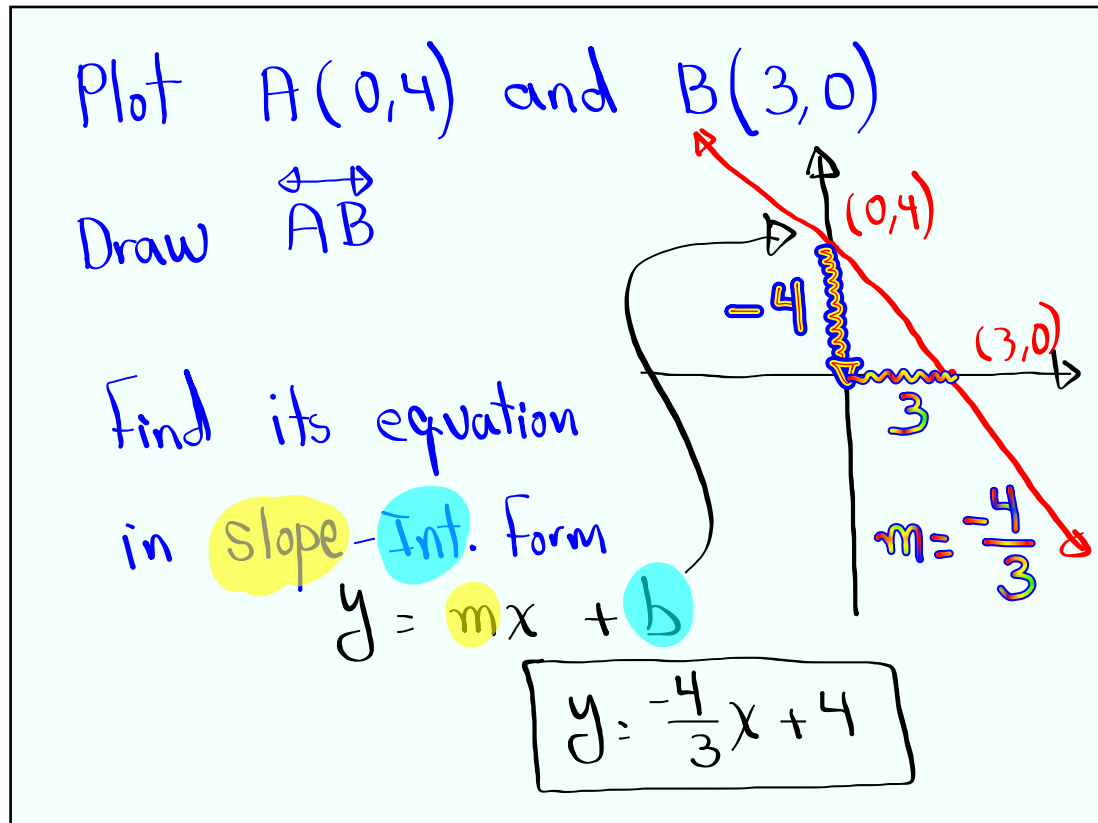
Simplify $\frac{9!}{6! \cdot 3!} = \frac{\cancel{9} \cdot \cancel{8} \cdot 7 \cdot \cancel{6!}}{\cancel{6!} \cdot \cancel{3} \cdot \cancel{2} \cdot 1}$

$$= 3 \cdot 4 \cdot 7 = \boxed{84}$$

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$$y = -2.5x - 8$$

1) Find y when $x=4$.

$$y = -2.5(4) - 8 = -10 - 8 = \boxed{-18}$$

2) Find x when $y=8$.

$$8 = -2.5x - 8$$

$$8 + 8 = -2.5x$$

$$16 = -2.5x$$

$$x = \frac{16}{-2.5}$$

$$\boxed{x = -6.4}$$

Round to whole # -6

Round up to whole # -7

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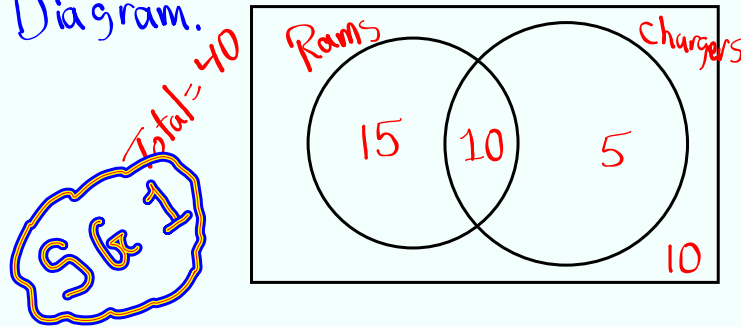
I Surveyed 40 people.

25 were Rams fan

15 " Chargers fan

10 " fan of both teams.

Organize this Survey in a Venn Diagram.



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What is Statistics?

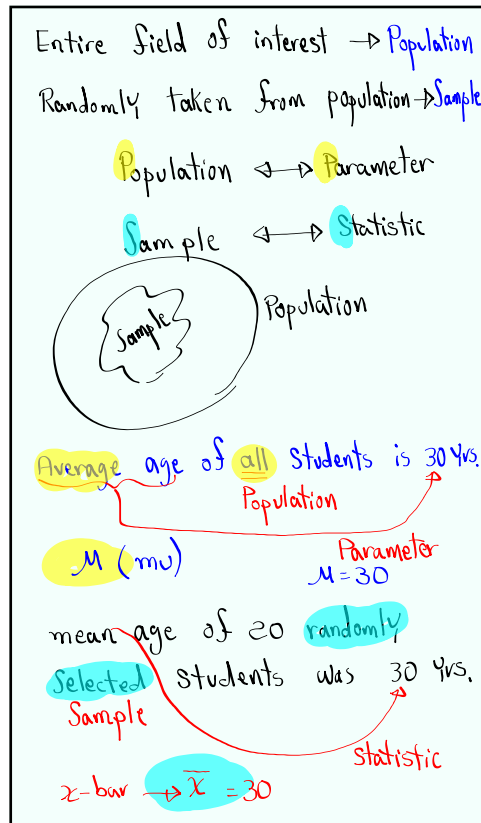
It is about collecting information (data)
organize them, graph them, do certain
computation and draw conclusion.

Two Branches:

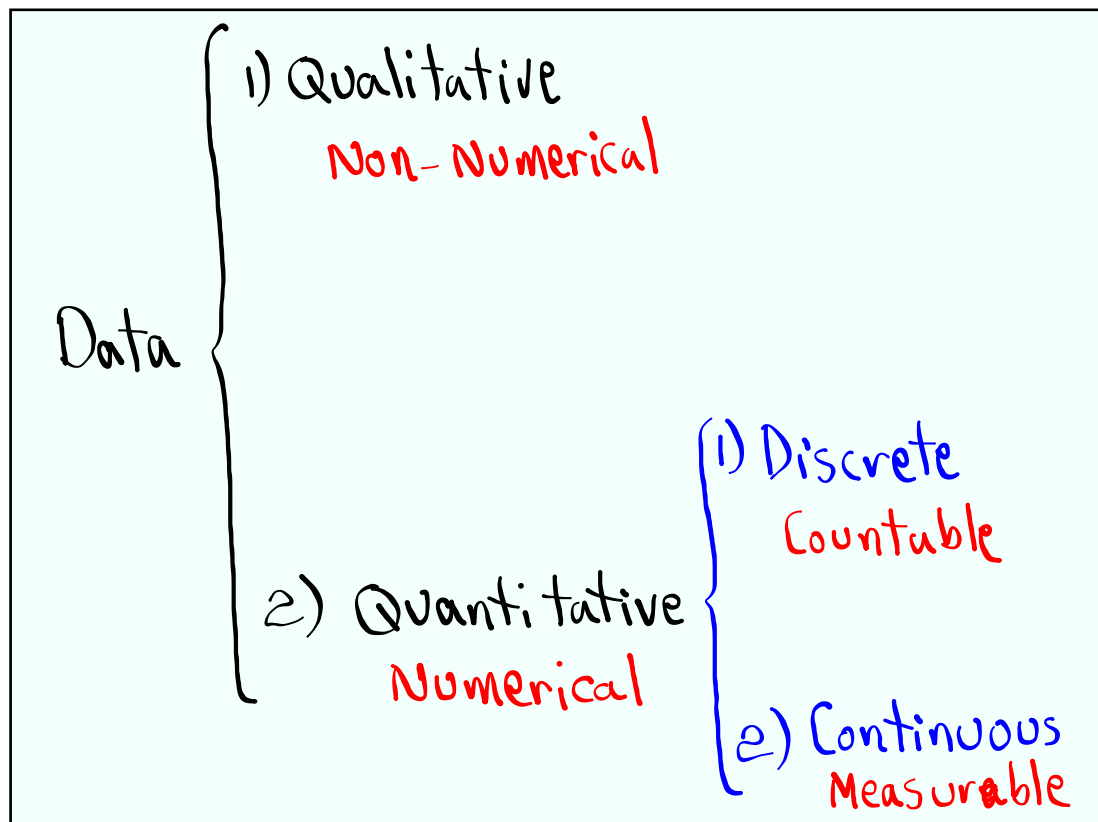
1) Descriptive
Collect data, organize, graph,
and calculation.

2) Inferential
Draw conclusion with some
degree of confidence and
make predictions.

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Level of Measurements:

- 1) Nominal Red, white, Blue
- 2) Ordinal Small, Med, Large, xlarge
size of shirts
29 30 31 32
- 3) Ratio Small 10 oz → 1 to 2
Large 20 oz
- 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

Do all members of selected groups.

4) Random / Convenience

Least Reliable Method

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Observation vs Experiment

You observe
changes, No
action taken

You take
action and
look for changes.

Simple Random Sample

Every data element have same
chance of being taken.

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A data Set has a min. Value of
20 and max. Value of 60.

Min = 20

Max = 60

$$1) \text{Max} - \text{Min} = 60 - 20 = \boxed{40}$$

$$2) \frac{\text{Max} + \text{Min}}{2} = \frac{60 + 20}{2} = \boxed{70}$$

$$3) \frac{(\text{Max} - \text{Min})^2}{4} = \frac{(60 - 20)^2}{4} = \frac{40^2}{4} = \frac{1600}{4} = \boxed{400}$$

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$$\text{Min.} = 15$$

$$\text{Max} = 45$$

$$1) \text{Max} - \text{Min} = \boxed{30}$$

$$4) \frac{(\text{Max} - \text{Min})^2}{12}$$

$$2) \frac{\text{Max} + \text{Min}}{2} = \boxed{30}$$

$$= \frac{30^2}{12} = \frac{900}{12}$$

$$= \boxed{75}$$

$$3) \frac{\text{Max} - \text{Min}}{4} = \frac{30}{4} = \boxed{7.5}$$

SG 2

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Consider the Sample below

2 3 3 4 8

$$1) \text{Sample Size } \boxed{n=5}$$

$$2) \text{Min} = 2, \text{Max} = 8$$

$$3) \text{Range} = \text{Max} - \text{Min} = 8 - 2 = \boxed{6}$$

$$4) \text{Midrange} = \frac{\text{Max} + \text{Min}}{2} = \frac{8 + 2}{2} = \boxed{5}$$

$$5) \text{Mode (data element that appears the most)} \quad \boxed{3}$$

$$6) \sum x = 2 + 3 + 3 + 4 + 8 = \boxed{20}$$

↑
Summation

$$7) \sum x^2 = 2^2 + 3^2 + 3^2 + 4^2 + 8^2 = \boxed{102}$$

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$$8) \frac{\sum x}{n} = \frac{20}{5} = \boxed{4}$$

$$9) \frac{n \sum x^2 - (\sum x)^2}{n(n-1)} = \frac{5 \cdot 102 - 20^2}{5(5-1)} = \frac{110}{20} = \boxed{5.5}$$

$$10) \sqrt{\text{Last Answer}} = \sqrt{5.5} = 2.34520788$$

Round to
whole #

$\boxed{2}$

1 - dec.

$\boxed{2.3}$

2 - dec.

$\boxed{2.35}$

Round up
to whole #

3

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Given $n = 10$, Min. = 2, Max. = 10

$$\sum x = 64, \sum x^2 = 472$$

$$1) \text{Range} = \text{Max} - \text{Min} = 10 - 2 = \boxed{8}$$

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

3) Mode (more info. needed)

$$4) \frac{\sum x}{n} = \frac{64}{10} = \boxed{6.4}$$

Round up
to whole # $\boxed{7}$

$$5) \frac{n \sum x^2 - (\sum x)^2}{n(n-1)}$$

$$= \frac{10 \cdot 472 - 64^2}{10(10-1)}$$

$$= \frac{624}{90} = \boxed{\frac{104}{15}}$$

Reduced fraction

624 $\div$ 90 Math 1:frac Enter

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Consider the Sample below

1 1 2 2 3 3 4 4 5 5

$$\text{Range} = \text{Max} - \text{Min} = 5 - 1 = \boxed{4}$$

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

Mode None

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