

Statistics

Lecture 1



Feb 19-8:47 AM

Basic Math Review

S&1

1) Reduce

$$\frac{100}{120}$$

$$\frac{100}{120} = \frac{\cancel{10} \cdot \cancel{10}}{\cancel{10} \cdot 12} = \frac{2 \cdot 5}{2 \cdot 6} = \frac{5}{6}$$

Work

$$1) \frac{5}{6}$$

2) write .5% as

a) decimal

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

$$2a) .005$$

b) reduced fraction

$$.5\% = .5\left(\frac{1}{100}\right) = \frac{1}{2} \cdot \frac{1}{100} = \frac{1}{200}$$

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

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3) In a survey of 120 students, 4% of them were smokers.

a) what % of them were non-smokers?

$$100\% - 4\% = \boxed{96\%}$$

3a) 96%

b) How many of them were smokers?

Round-up if decimal.

what is 4% of 120?

3b) 5

$$x = .04(120) = 4.8 \approx 5$$

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! Factorial

$$0! = 1$$

$$1! = 1$$

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

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

$$4! = 4 \cdot 3 \cdot 2 \cdot 1 = 24$$

⋮

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

Simplify $5! - 4! =$

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

$$120 - 24 = \boxed{96}$$

Simplify

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

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Scientific Notation

$$N \times 10^n$$

$\uparrow$ $1 \leq N < 10$
 $\nwarrow$ any integer

$$4.8 \times 10^5 = 4.8 (10000) = \underline{480000}$$

$$2.5 \times 10^{-8} = \underline{0.000000025}$$

$$0.000000025$$

optional

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Use Your Calc to Simplify

$$\frac{74 - 62}{\frac{8}{\sqrt{25}}} = \frac{12}{\frac{8}{5}} = \frac{12}{1.6} = \underline{7.5}$$

$$1.725 \cdot \sqrt{\frac{(2)(8)}{36}} = 1.725 \cdot \sqrt{\frac{.16}{36}}$$

$$= 1.725 \cdot \frac{.4}{6} = \underline{.115}$$

$$1.725 \times .4 \div 6 \text{ Enter}$$

Round to

1 - dec

.1

2 - dec.

.12

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$$y = 8x - 40$$

1) Find y when $x = -5$.

$$y = 8(-5) - 40 = -40 - 40 = \boxed{-80}$$

2) Find x when $y = 40$.

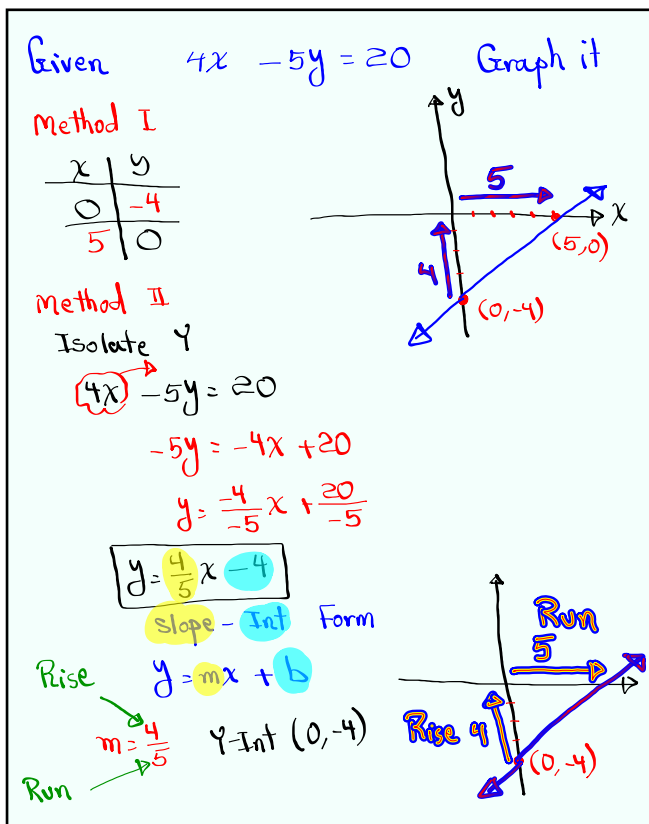
$$40 = 8x - 40$$

$$40 + 40 = 8x$$

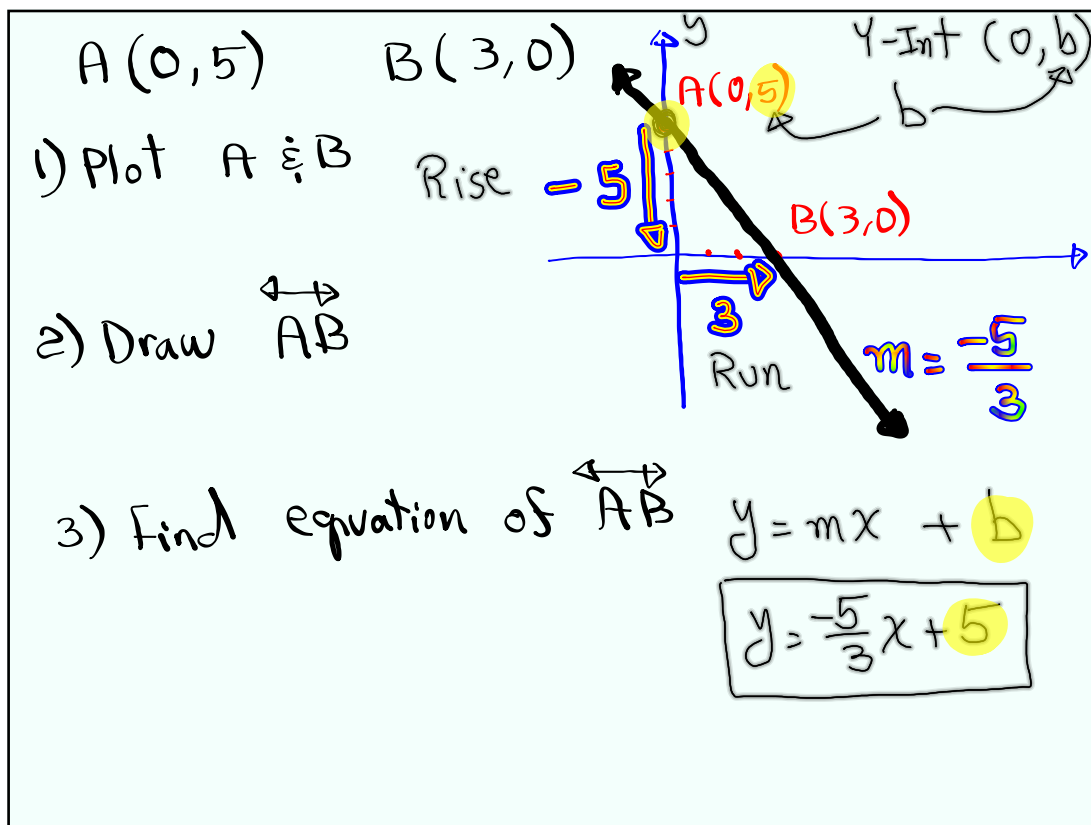
$$80 = 8x$$

$$\boxed{x = 10}$$

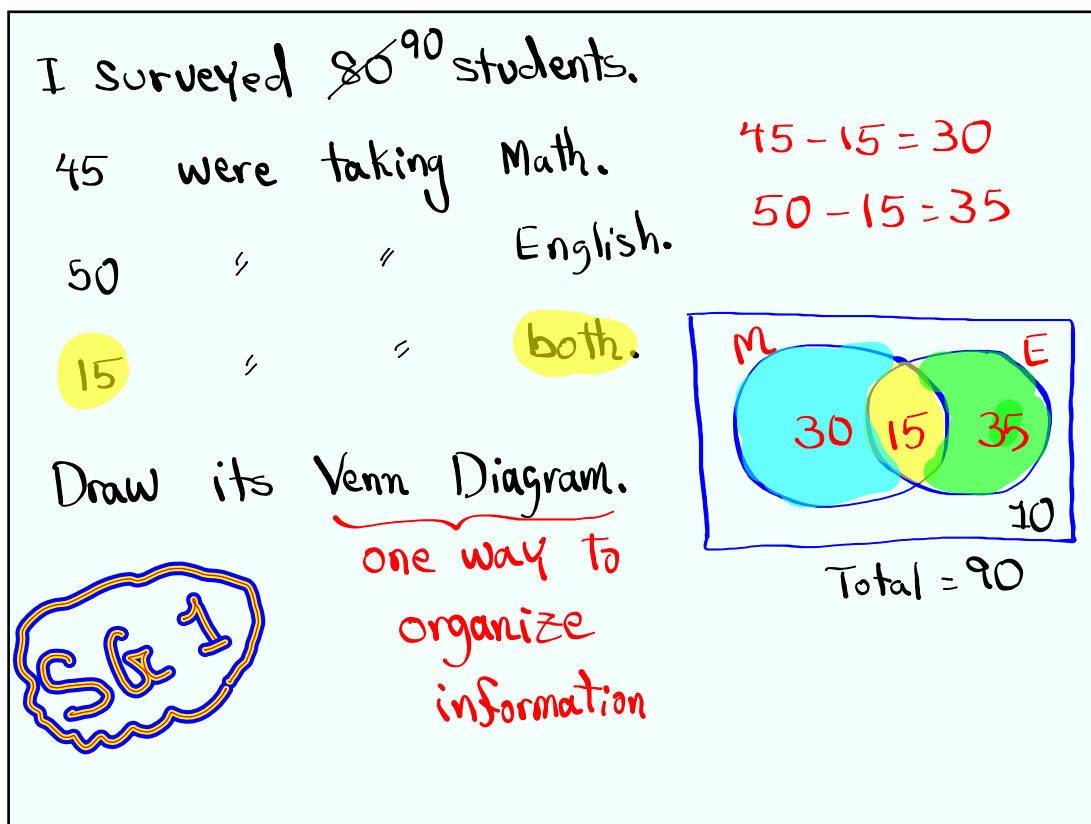
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Language of statistics:

SG 2

What is statistics?

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

Two Branches:

1) Descriptive

Collect data, organize, graph, and
Computations

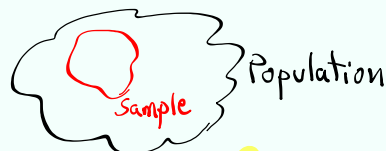
2) Inferential

Draw conclusion and make predictions

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Population → Entire field of interest

Sample → data collected from population



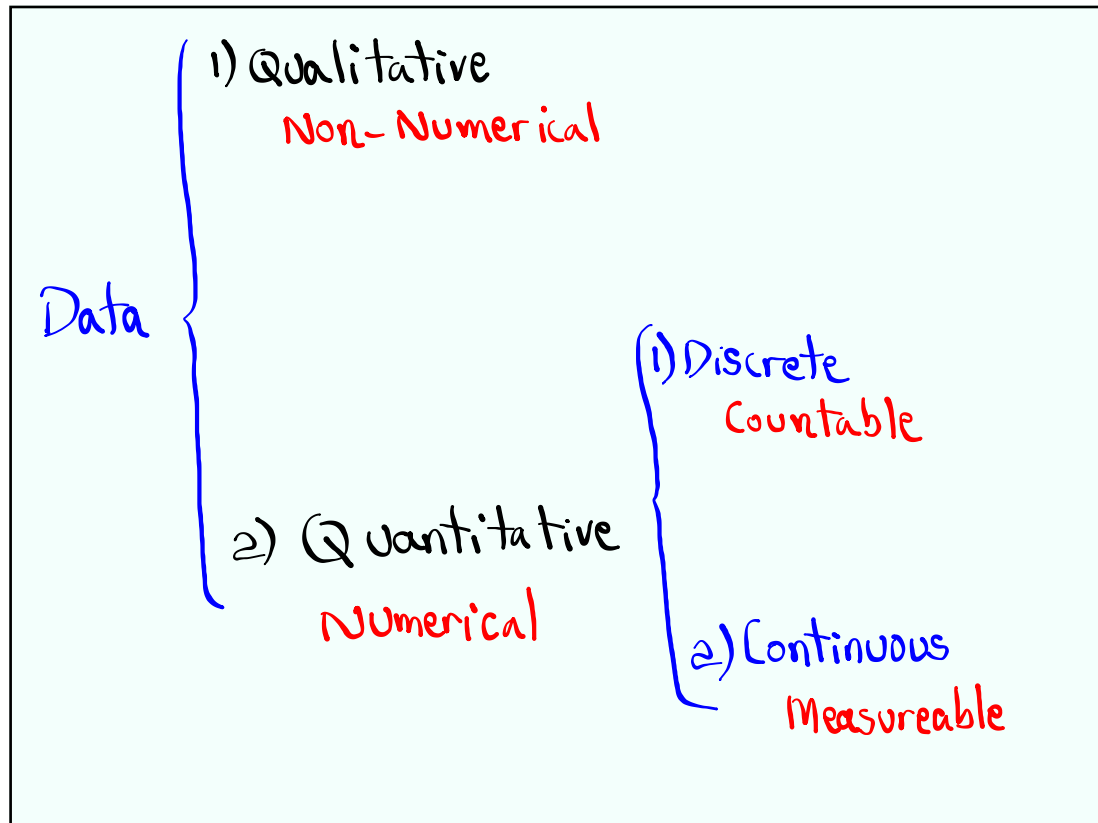
Population ↔ Parameter

Sample ↔ Statistic

Average age of all students is 32 Yrs.
Population
Parameter

Average age of 25 students randomly Selected
Sample
Statistic
 was 30 Yrs.

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Level of measurements:

1) Nominal	Red, white, Blue Toyota, Ford, Chevy Small, Med., large
2) Ordinal	Small Med Large xlarge Shirt Size 10 12 15 20 25 30
3) Ratio	Small 10 oz → 1 to 2 Large 20 oz
4) Interval	Range of values 90-100 → A Below 10 Yrs → \$20 between 10 and 59 → \$35 above 60 → \$30

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How to Collect Samples: Sampling Method

- 1) Systematic every k th item Selected.
- 2) Stratified Divide into groups
Select from each group.
- 3) cluster Divide into groups
Select some groups
Collect information from all
in the selected groups
- 4) Random / Convenience
Least Reliable Method

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Observation VS. Experiment

You observe
without taking
any action

You observe
changes due to
action.

Simple Random Sample

Every data element has same chance
of being taken.

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$$\text{Max.} = 60 \quad \text{Min.} = 20$$

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

$$2) \frac{\text{Max} + \text{Min}}{2} = \frac{60 + 20}{2} = 70 \quad \leftarrow \boxed{40}$$

$(60 + 20) \div 2$

$$3) \frac{(\text{Max} - \text{Min})^2}{100} = \frac{(60 - 20)^2}{100} = \frac{40^2}{100} = \frac{1600}{100}$$

SG 2

$$= \boxed{16}$$

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