

Statistics

Lecture 1



Feb 19-8:47 AM

Math 110 Friday 11:30 AM - 2:40 PM

Some Math Review

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

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

2) write .5%

a) in decimal

$.5\% = .5(.01) = \boxed{.005}$

2a) $\underline{.005}$

b) in reduced fraction

$.5\% = \frac{.5 \cdot 10}{100 \cdot 10} = \frac{5}{1000} = \frac{\cancel{5} \cdot 1}{\cancel{5} \cdot 200} = \frac{1}{200}$

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

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3) 2.5% of 180 students were smokers.

How many of them were smokers?

What is 2.5% of 180?

$$x = 2.5(0.01) \cdot 180$$

$$= .025(180)$$

$$= 4.5 \approx \boxed{5}$$

3) 5

4) 12 students out of 150 randomly selected students were left-handed.

What % of them were left-handed?

12 is what % of 150?

$$\frac{12}{150} \cdot 100 = \frac{1200}{150} = 8$$

4) 8%

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Scientific Notation

$$N \times 10^n$$

$$\uparrow$$

$$1 \leq N < 10$$

any integer

$$2.5 \times 10^8 \quad (\text{Large})$$

$$1.75 \times 10^{-6} \quad (\text{Small})$$

$$2.5 \times 10^8 = 2.5 \underbrace{00000000}_{8 \text{ zeros}}$$

$$= 250,000,000$$

$$\underbrace{0.0000000000675}_{10 \text{ times}} = 6.75 \times 10^{-10}$$

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use Your Calc to Simplify

$$\frac{10(640) - 80^2}{10(10-1)} = \frac{6400 - 6400}{10 \cdot 9} = \frac{0}{90} = 0$$

Do not use $\textcircled{0}$ for 0.

Zero

undefined
NO Solution
Empty Set

$$1.645 \cdot \sqrt{\frac{(68)(.2)}{100}}$$

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

$$= 1.645(.04)$$

$$\approx .0658$$

Round to

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

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$$\frac{35 - 27}{\frac{10}{\sqrt{4}}} = \frac{8}{\frac{10}{2}} = \frac{8}{5} = 1.6$$

Round-up to a whole # 2

Round to a whole # 2

! Factorial

$0! = 1$ $3! = 3 \cdot 2 \cdot 1 = 6$

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

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

$20! = 20 \cdot 19 \cdot 18 \cdot 17 \dots 3 \cdot 2 \cdot 1$

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

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

Simplify $\frac{7! - 4!}{3!} = \frac{5040 - 24}{6}$

$= \frac{5016}{6} = \boxed{836}$

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$y = 2.4x - 10$ Linear eqn in
2 Variables

Find y when $x = -5$

$y = 2.4(-5) - 10$
 $= -12 - 10 = \boxed{-22}$

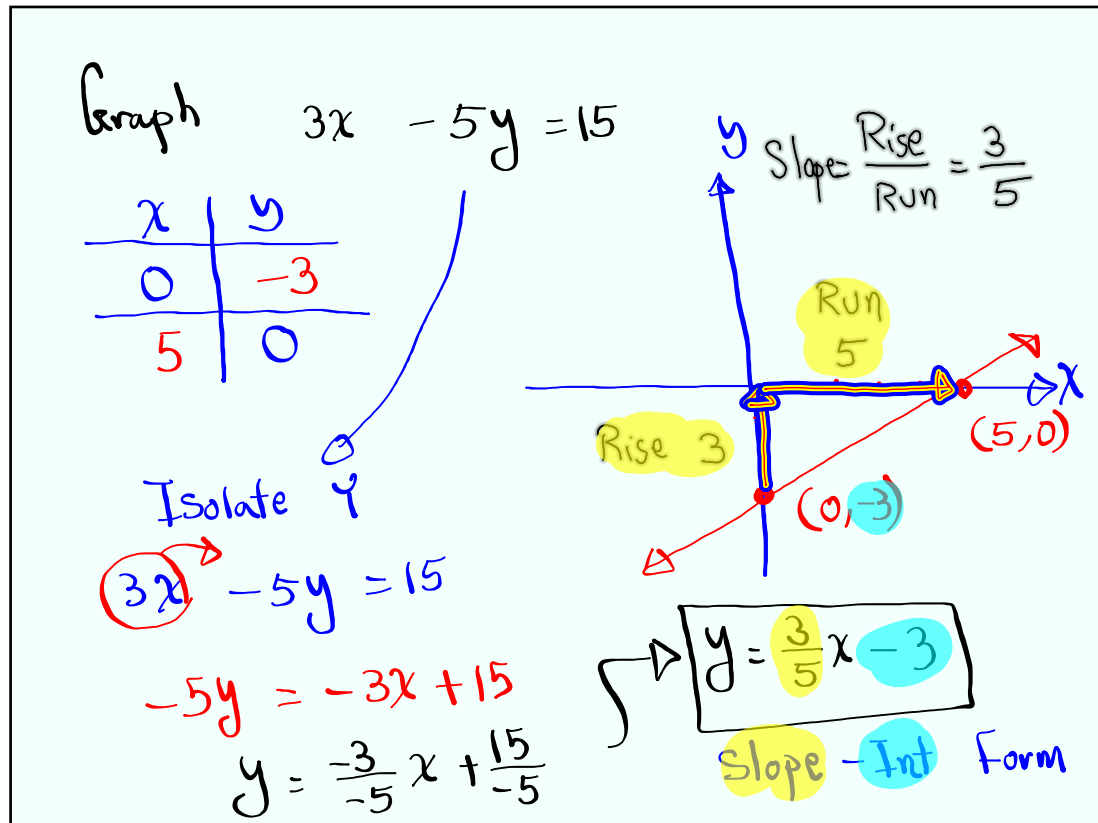
Find x when $y = 10$

$10 = 2.4x - 10$

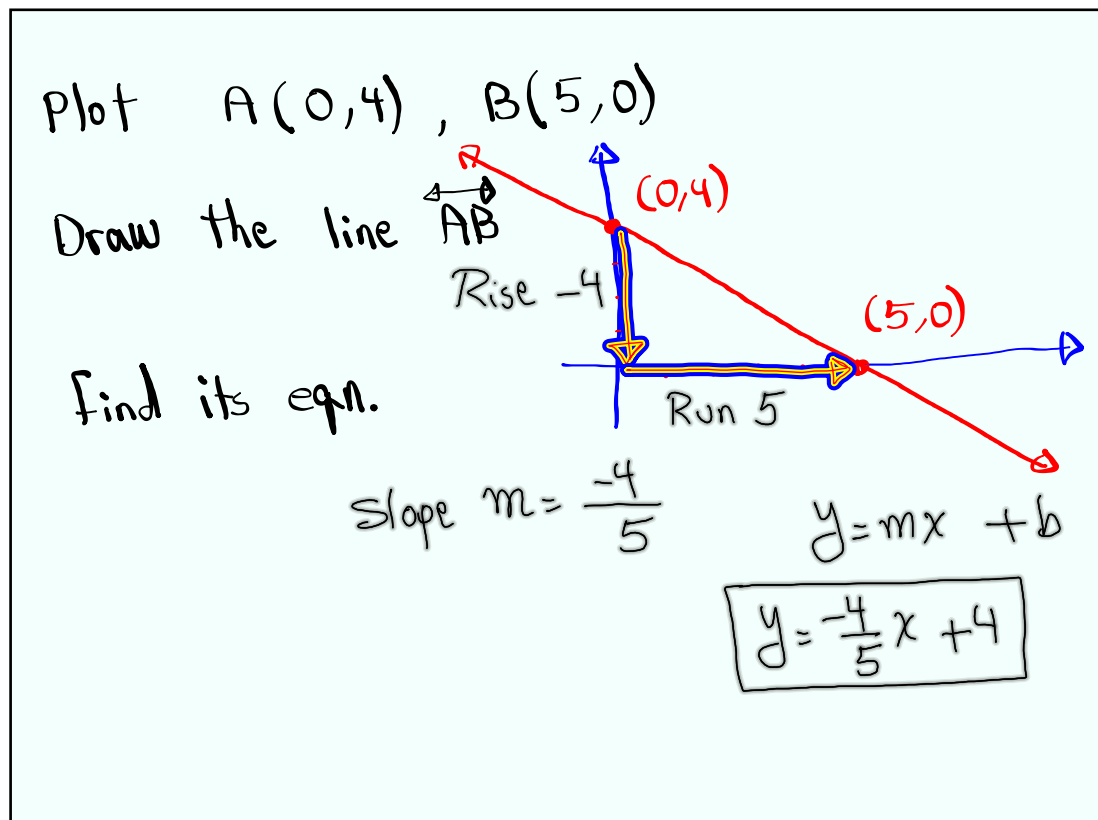
$10 + 10 = 2.4x$ $x = \frac{20}{2.4}$
 $20 = 2.4x$ $= 8.\bar{3}$

Round up to a whole# 9
Round to a whole# 8

Aug 30-12:09 PM



Aug 30-12:15 PM



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35 Students
 20 had iPhones
 12 " iPads
 8 had iPhones & iPads.

Organize this in a Venn Diagram

Total 35

SG 1 ✓

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What is statistics? SG 2

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

Two Branches

- 1) Descriptive
 Collect data, organize, graph, do Computations
- 2) Inferential
 We draw conclusion based on descriptive statistics and make predictions

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Data randomly Selected \rightarrow Sample (Few, Randomly Selected)
 Entire field of interest \rightarrow Population (All, Every)

we study Samples to learn about populations

Sample \leftrightarrow Statistic
 Population \leftrightarrow Parameter

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Data {

- 1) Qualitative (Non-Numerical)
 - Type of Cars
 - Eye Color
 - dress style
- 2) Quantitative (Numerical)
 - 1) Discrete (Countable) # of Students
 - 2) Continuous (Measurable) classroom temp

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Level of measurements:

1) Nominal Red White Blue
 Ford Toyota Nissan
 Small Med. Large

2) Ordinal Small Med. Large
 A B C D

3) Ratio Small 10 oz ~~Shirt size 10~~
 Large 20 oz ~~20~~

4) Interval Range of values 90% - 100% → A
 Small (10 - 12) Shipping cost

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How to collect data (Sampling Method):

1) Systematic
 Every kth item selected
 Every 5th call is recorded
 Every 10th item selected for inspection

2) Stratified
 Divide into groups
 Select few from each group

35 Students { 20 Females (select 9)
 15 Males (select 6)

Cal poly Pomona { 1) Fresh. (select 100)
 2) Soph. (select 150)
 3) Jr. (select 80)
 4) Sr. (select 50)
 5) Graduate students (20)

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3) Cluster
 Divide into groups
 Select randomly few groups
 Collect data from all members of selected groups.

Jose is the general manager of 30 branches of BofA.
 He selects 5 branches, and ask all employees to do evaluation.

College offers 2000 classes during Semester. 50 classes were randomly selected. All those students had to students.

4) Random/ Convenience
 Least Reliable Method.

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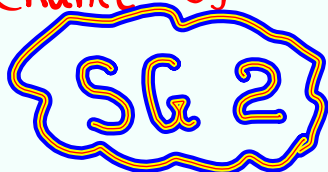
Experiment Vs Observation

observe change due to action taken

observe without taking any action

Simple Random Sample

All items have same chance of being Selected



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Consider the Sample below

1 2 2 2 7

1) Sample Size $n=5$

2) Range = Max - Min = $7 - 1 = 6$

3) Midrange = $\frac{\text{Max} + \text{Min}}{2} = \frac{7+1}{2} = 4$

4) Mode 2

5) $\sum x = 1 + 2 + 2 + 2 + 7 = 14$
 ↑ Summation
 ↗ data element

6) $\sum x^2 = 1^2 + 2^2 + 2^2 + 2^2 + 7^2 = 62$

7) Compute $\frac{n \sum x^2 - (\sum x)^2}{n(n-1)} = \frac{5 \cdot 62 - 14^2}{5(5-1)}$
 $= \frac{310 - 196}{20} = \frac{114}{20} = 5.7$

8) $\sqrt{\text{Last ans}} = \sqrt{5.7} \approx 2.387$ Round up to a whole #
 whole → 2
 1-decimal → 2.4
 2-decimal → 2.39

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Consider the Sample below

2 3 3 3 5 5 5 10

$10 + 2 \div 2 = 11$

$(10 + 2) \div 2 = 6$

1) Sample Size $n=8$

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

2) Range = Max - Min = $10 - 2 = 8$

4) Mode 3 & 5
 Bimodal

5) $\sum x = 2 + 3 + 3 + 3 + 5 + 5 + 5 + 10 = 36$

6) $\sum x^2 = 2^2 + 3^2 + 3^2 + 3^2 + 5^2 + 5^2 + 5^2 + 10^2 = 206$

7) Compute $\frac{n \sum x^2 - (\sum x)^2}{n(n-1)} = \frac{8 \cdot 206 - 36^2}{8(8-1)}$
 $= \frac{1648 - 1296}{56} = \frac{352}{56} \approx 6.286$

8) $\sqrt{\text{Last Ans}} = \sqrt{6.286} \approx 2.507$

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

$$1) \text{ Range} = \text{Max} - \text{Min}$$

$$= 55 - 15$$

$$= \boxed{40}$$

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

$$= \frac{55 + 15}{2}$$

$$= \boxed{35}$$

$$3) \frac{\text{Range}}{3} \quad \text{if decimal} \rightarrow \text{Round up}$$

$$\frac{40}{3} = 13.\bar{3}$$

if whole $\rightarrow +1$

14

$$4) \frac{\text{Range}}{4} \quad \text{if decimal,} \rightarrow \text{Round up}$$

$$\frac{40}{4} = 10$$

if whole $\rightarrow +1$

11

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