Statistics

Lecture 1

Feb 19-8:47 AM

Basic Math Review

1) Reduce $\dfrac{80}{125} = \dfrac{5 \cdot 16}{5 \cdot 25} = \boxed{\dfrac{16}{25}}$

1) $\dfrac{16}{25}$

2) Convert .4% to

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

a) .004

   b) Reduce fraction

   .4% = $\dfrac{.4}{100} = \dfrac{.4(10)}{100 \cdot 10} = \dfrac{4}{\underset{25}{100 \cdot 10}} = \boxed{\dfrac{1}{250}}$ b) $\dfrac{1}{250}$

3) 6% of 250 randomly selected students were left-handed. How many were left-handed?

    what is 6% of 250?

      $x = .06(250) = \boxed{15}$

TI-83
  or
TI-84

3) 15

Jan 9-4:32 PM

Scientific Notation

It is used for very large numbers or very small numbers.

$325,000,000 = 3.25 \times 10^8$

$0.000000085 = 8.5 \times 10^{-8}$

$N \times 10^n$

$1 \leq N < 10$

any integer

Jan 9-4:38 PM

Use Your Calc to Simplify

$$\frac{8(100) - 30^2}{8(8-1)} = \frac{800 - 900}{56} = \frac{-100}{56} = -1.7857\ldots$$

Round to 3-decimal places ≈ -1.786

$$\frac{28 - 21}{\frac{8}{\sqrt{16}}} = \frac{7}{\frac{8}{4}} = \frac{7}{2} = 3.5$$

$$1.645 \cdot \sqrt{\frac{(.2)(.8)}{25}} = 1.645 \cdot \sqrt{\frac{.16}{25}} = 1.645 \cdot \frac{.4}{5}$$

$$= .1316$$

Round to 2-decimal places $.13$

Jan 9-4:42 PM

! factorial

$1! = 1$

$0! = 1$

$n! = n(n-1)(n-2)\cdots3\cdot2\cdot1$

find 5!

$5! = 5\cdot4\cdot3\cdot2\cdot1 = \boxed{120}$

Simplify

$$\frac{8!}{2!\cdot6!} = \frac{\overset{4}{\cancel{8}}\cdot7\cdot\cancel{6}\cdot\cancel{5}\cdot\cancel{4}\cdot\cancel{3}\cdot\cancel{2}\cdot\cancel{1}}{\cancel{2}\cdot\cancel{1}\cdot\cancel{6}\cdot\cancel{5}\cdot\cancel{4}\cdot\cancel{3}\cdot\cancel{2}\cdot\cancel{1}}$$

$= 4\cdot7 = \boxed{28}$

Jan 9-4:49 PM

In a deck of playing cards, there are 40 cards and 3 are aces.

what % of cards are aces?

3 is what percent of 40?

$\dfrac{3}{40}\cdot100 = 7.5$

<u>7.5%</u>

Jan 9-4:52 PM
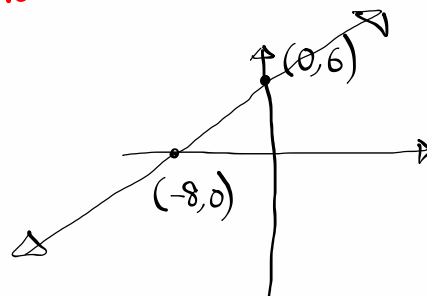
Given $\quad 3x - 4y = -24$

Linear Equation

x	y
0	6
-8	0

Intercepts

$$y = \frac{-2}{3}x + 2$$

Slope-Int

$m = \frac{-2}{3}$

Y-Int
$(0,2)$

$(0,6)$

$(-8,0)$

$(0,2)$

2

3
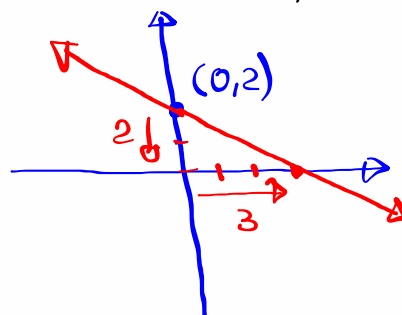
Jan 9-4:55 PM

Given $\quad y = 5x + 10$

Find y when $x = -2$.

$$y = 5(-2) + 10$$
$$= -10 + 10 = \boxed{0}$$

Do not use $\emptyset$ for 0.

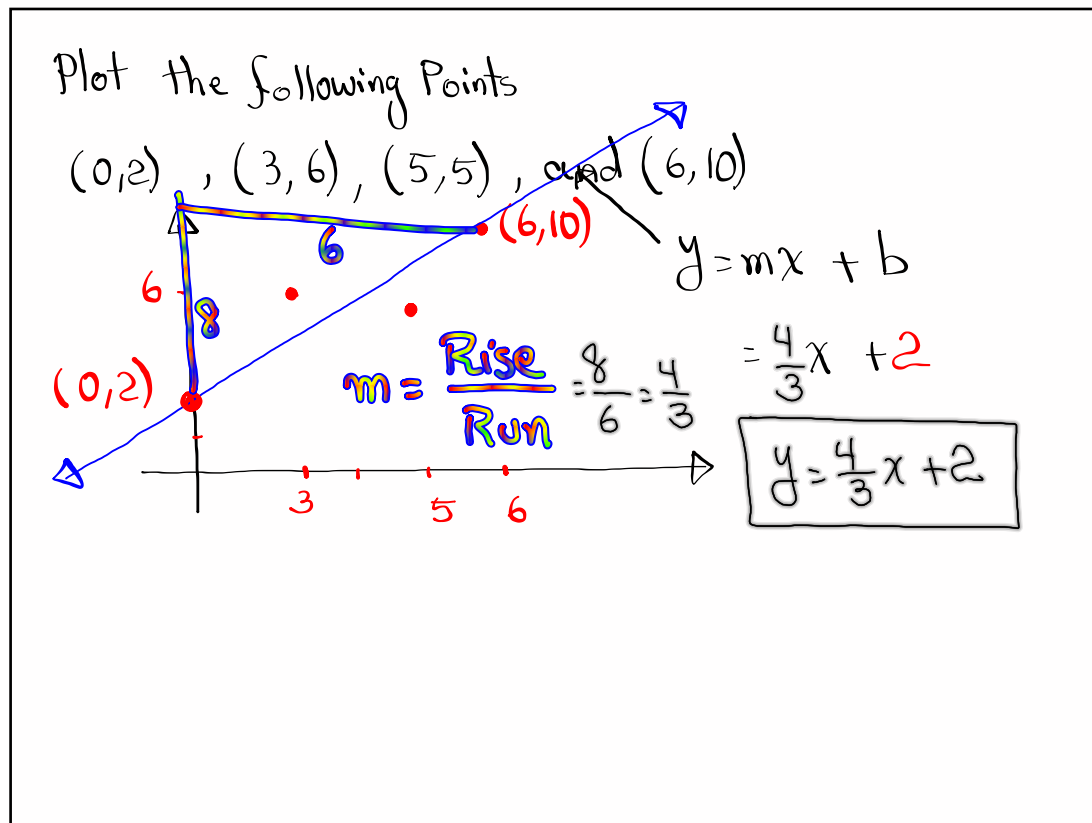find x when $y = -10$.

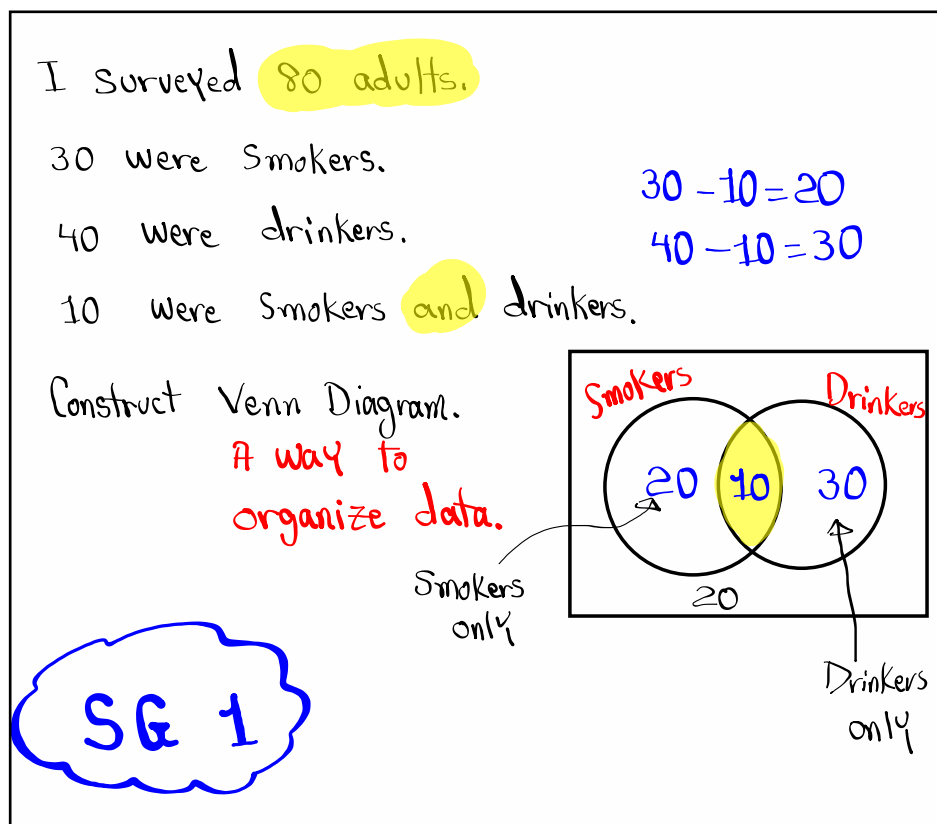$$-10 = 5x + 10$$
$$-10 - 10 = 5x$$
$$-20 = 5x$$
$$\frac{-20}{5} = x$$
$$\boxed{x = -4}$$

Jan 9-5:00 PM

Plot the following Points

$(0,2)$, $(3,6)$, $(5,5)$, and $(6,10)$

$(6,10)$

$y = mx + b$

6
8

$(0,2)$

$m = \dfrac{Rise}{Run} = \dfrac{8}{6} = \dfrac{4}{3}$

$= \dfrac{4}{3}x + 2$

$$y = \dfrac{4}{3}x + 2$$

3   5   6

Jan 9-5:04 PM

I Surveyed 80 adults.

30 were Smokers.

40 were drinkers.

10 were Smokers and drinkers.

$30 - 10 = 20$
$40 - 10 = 30$

Construct Venn Diagram.
A way to
organize data.

Smokers   Drinkers

20   10   30

20

Smokers only

Drinkers only

SG 1

Jan 9-5:08 PM

5

What is Statistics?

SG.2

It is about collecting information (Data), organize them, graph them, do certain computation, draw conclusion from them and make Predictions.

Two Branches

1) **Descriptive** : Work with data, graph, Compute, and learn from it.

2) **Inferential**: We draw conclusion from data & make Prediction with Some degree of confidence.

Jan 9-5:39 PM

Entire field of interest → Population
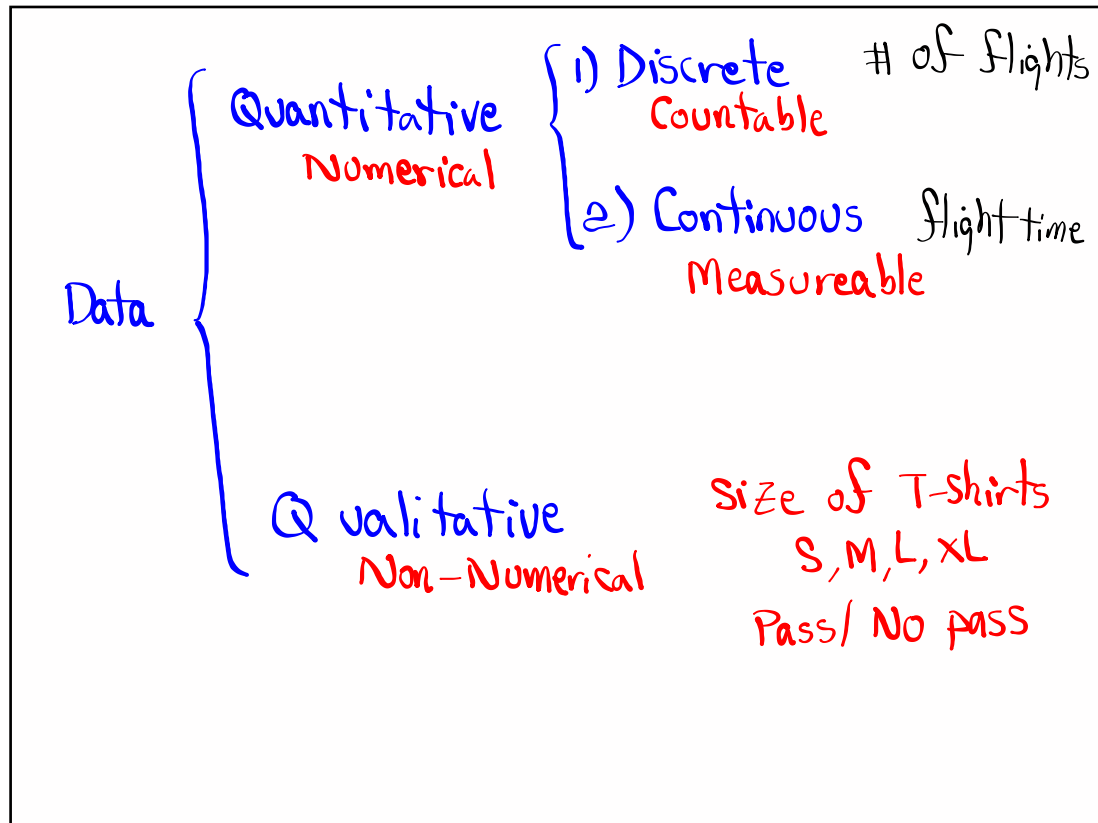
Randomly Select from population → Sample

Population ←→ Parameter

Sample ←→ Statistic

Average age of (all teachers) in LA County is 38 Yrs.　　Parameter

Median Salary of (40 randomly Selected nurses) in LA was $7500.

Statistic

Jan 9-5:43 PM

Quantitative
Numerical

{ 1) Discrete   # of flights
     Countable

  2) Continuous   flight time
     Measureable

Data {

Qualitative
Non-Numerical

Size of T-shirts
S, M, L, XL
Pass/ No pass

Jan 9-5:47 PM

Level of measurements

1) Nominal   Small, Med, Large,
                         Red, white, Blue

2) Ordinal   S, M, L, XL

3) Interval (Range of values)   90%-100% →A

4) Ratio   Small (12 oz)
                       Large (24 oz)

Jan 9-5:52 PM

Sampling Method:

1) Systematic   Every Kth item selected.

2) Stratified   Divide into groups
                 Select few from each group
                 Males   select 8
                 Females → select 12

3) Cluster   Divide into groups
                 Select few groups
500 Sections   Collect information from all
  Select 50 of them   in selected groups
  ask all students to
    do the survey.

4) Random or Convenience
      "Least Reliable method to collect data"

Jan 9-5:57 PM

I Selected   100 freshmen, 200 Sophmore, 150 Jr.
100 Sr., and 50 graduate students from
Cal Poly to do a survey.
            Stratified.

John is a general manager of Taco Bell
and has 40 stores. He Selected 8 Stores
and ask all employees to do a survey.
            Cluster

Jan 9-6:05 PM

Observation & Experiment.

observation : observe changes due to no action taken.

Experiment : observe changes due to Some action taken.

Simple random Sample : All outcomes have Same chance of Consideration / Selection

flip a Coin   H or T

SG 2

Jan 9-6:09 PM

Consider the Sample below
1, 3, 3, 4, 9

1) Sample Size $n = 5$

2) Min. $= 1$, Max $= 9$

3) Range $=$ Max $-$ Min $= 9 - 1 = 8$

4) Midrange $= \dfrac{\text{Max} + \text{Min}}{2} = \dfrac{9+1}{2} = 5$

5) Mode $= 3$

6) $\sum x = 1 + 3 + 3 + 4 + 9 = 20$
   Summation

7) $\sum x^2 = 1^2 + 3^2 + 3^2 + 4^2 + 9^2 =$
   $1 + 9 + 9 + 16 + 81 = 116$

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

9) $\dfrac{n \sum x^2 - (\sum x)^2}{n(n-1)} = \dfrac{5 \cdot 116 - 20^2}{5(5-1)} = \dfrac{180}{20} = \boxed{9}$

Jan 9-6:19 PM

Consider the following Sample

2, 3, 3, 4, 4, 7

1) Sample Size $n = 6$

2) Min. = 2, Max = 7

3) Range = Max − Min = 7 − 2 = 5

4) Midrange = $\dfrac{\text{Max} + \text{Min}}{2} = \dfrac{7+2}{2} = 4.5$

5) Mode: 3 & 4

6) $\sum x = 2+3+3+4+4+7$
$= \boxed{23}$

$\sum x^2 = 2^2+3^2+3^2+4^2+4^2+7^2$
$= 4+9+9+16+16+49$
$= \boxed{103}$

7) $\dfrac{n\sum x^2 - (\sum x)^2}{n(n-1)} = \dfrac{6 \cdot 103 - 23^2}{6(6-1)} = \boxed{\dfrac{89}{30}}$

Jan 9-6:27 PM

Consider the Sample below

2, 2, 2, 2, 4, 4, 4, 4

1) $n = 8$

2) Range = Max − Min = 4 − 2 = 2

3) Midrange = $\dfrac{\text{Max} + \text{Min}}{2} = \dfrac{4+2}{2} = 3$

4) Mode None

5) $\sum x = 24$

6) $\sum x^2 = 80$

7) $\dfrac{\sum x}{n} = \dfrac{24}{8} = \boxed{3}$

8) $\dfrac{n\sum x^2 - (\sum x)^2}{n(n-1)}$
$= \dfrac{8 \cdot 80 - 24^2}{8(8-1)}$
$= \dfrac{64}{56} = \boxed{\dfrac{8}{7}}$

Jan 9-6:33 PM

How to organize data

we do it in a form of a table called freq. table.

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

then we draw

1) Bar chart   2) Histogram   3) Ogive

4) Pie chart   5) Box plot   6) Stem Plot

7) Freq. Polygon

Jan 9-6:42 PM