Statistics

Lecture 1

Feb 19-8:47 AM

Basic Math Review:

1) Reduce $\frac{75}{120} = \frac{\cancel{3}\cdot 25}{\cancel{3}\cdot 40} = \frac{\cancel{5}\cdot 5}{\cancel{5}\cdot 8} = \boxed{\frac{5}{8}}$

1) $\frac{5}{8}$

2) Convert .025 to

a) Reduce Fraction

$.025 = \frac{25}{1000} = \frac{\cancel{5}\cdot 5}{\cancel{5}\cdot 200} = \frac{\cancel{5}\cdot 1}{\cancel{5}\cdot 40} = \boxed{\frac{1}{40}}$ a) $\frac{1}{40}$

b) % Notation

$.025(100)\% = \boxed{2.5\%}$

b) 2.5%

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3) I surveyed 250 students and 8% of them were left-handed.

How many were left-handed?

what is 8% of 250?

$x = (.08) \cdot 250 = \boxed{20}$ 3) 20

Calc. → use TI-83 or TI-84

In a class of 40 students, 5 were late on first day. what % of them were late on first day? 5 is what % of 40?

$\frac{5}{40} \cdot 100 = \frac{500}{40} = \frac{50}{4} = \frac{25}{2}$

$= 12.5$

12.5%

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Scientific Notation

used to write very large or very small numbers.

$N \times 10^n$

$1 \le N < 10$

any integer $\{\ldots, -3, -2, -1, 0, 1, 2, \ldots\}$

2.8×10^7 , 1.25×10^{-4}

$2.8 \times 10^7 = 2.8000000 = 28{,}000{,}000$

$1.25 \times 10^{-4} = 00001.25 = 0.000125$

optional

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Simplify

$$\frac{5\cdot 800 - 40^2}{5(5-1)} = \frac{4000-1600}{20}$$

$$= \frac{2400}{20} = \boxed{120}$$

Simplify, Round to 1-decimal

$$\frac{36-28}{\frac{6}{\sqrt{16}}} = \frac{8}{\frac{6}{4}} = \frac{8}{\frac{3}{2}} = \frac{8}{1.5} = 5.\overline{3}$$

Simplify, Round to 2-decimal places

5.3

$$1.96\cdot\sqrt{\frac{(.8)(.2)}{25}} = 1.96\cdot\sqrt{\frac{.16}{25}}$$

.16

$$= 1.96\cdot\frac{.4}{5} = .1568$$

Mar 1-8:27 AM

! Factorial

$0! = 1$

$1! = 1$

$2! = 2\cdot 1 = 2$

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

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

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

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

$$= 8\cdot 7\cdot 6\cdot 5 = \boxed{1680}$$

Simplify

$$\frac{7!}{4!\cdot 3!} = \frac{7\cdot \cancel{6}\cdot 5\cdot \cancel{4!}}{\cancel{4!}\cdot \cancel{3\cdot 2}\cdot 1} = \frac{35}{1} = \boxed{35}$$

Simplify

$$\frac{5(180) - 30^2}{5(5-1)} = \frac{900-900}{20} = \frac{0}{20} = \boxed{0}$$

Do not use Ø for 0.

Mar 1-8:34 AM

In a deck of playing cards with 50 cards total, there are 7 face cards.

What % of these cards are face cards?

7 is what % of 50?

$$\frac{7}{50} = \frac{P}{100}$$

Cross-Multiply

$50P = 700$

$P = \frac{700}{50}$

$P = 14$

14%

Mar 1-8:43 AM

Given $y = 5.8x - 40$

1) Find y when $x = 15$

$y = 5.8(15) - 40 = \boxed{47}$

2) Find x when $y = 40$

$40 = 5.8x - 40$

$40 + 40 = 5.8x$

$80 = 5.8x$

$x = \frac{80}{5.8}$

$x = 13.793\ldots$

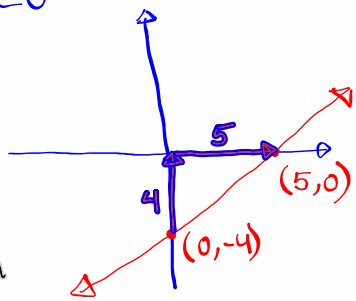
Round to whole $\boxed{x \approx 14}$

Mar 1-8:47 AM

Graph $4x - 5y = 20$

x	y
0	-4
5	0

Slope $m = \frac{4}{5}$ Rise / Run



Graph $y = \frac{-2}{3}x + 5$

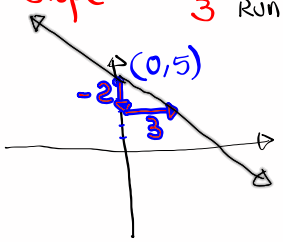
(0,b)

Y-Int (0,5)

$y = mx + b$

Slope-Int. Form

Slope $\frac{-2}{3}$ Rise / Run



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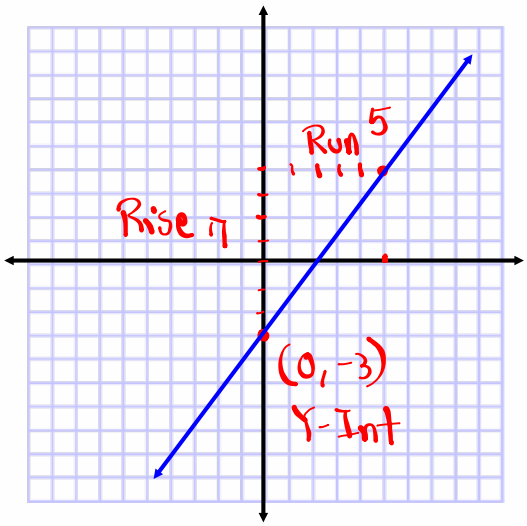
Plot the points $(0,-3)$ & $(5,4)$, then find the eqn of the line that contains them.

$y = mx + b$

$\boxed{y = \frac{7}{5}x - 3}$



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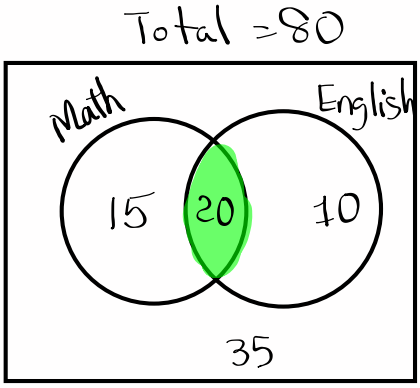
I Surveyed 80 Students.

35 were taking Math.

30 " " English

20 " " both.

Make Venn Diagram



SG 1

It is a way to organize and display the information.

Mar 1-9:02 AM

SG 2

What is Statistics?

It is about collecting information (data), organize them, graph them, perform certain calculations, and draw conclusion from them with some degree of confidence

Two Branches

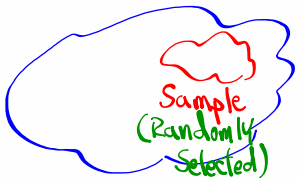
1) Descriptive — Collect data, organize, graph, do computations

2) Inferential — To draw conclusion and make predictions

Mar 1-9:40 AM

Entire field of interest → Population

Data randomly selected from Population → Sample



Population (All, every)

Population ⟷ Parameter

Sample ⟷ Statistic

Median income for all nurses in LA is $6800/mo

Average age of 200 students randomly selected was 28.5 yrs.

Mar 1-9:44 AM

Data
"information"

1) Qualitative (Non-Numerical)
   - Gender
   - Rare
   - Color
   - Name of states

2) Quantitative (Numerical)
   1) Discrete
      Countable
      # of students
   2) Continuous
      Measureable
      Room temp.

Mar 1-9:50 AM

Level of Measurements:

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

2) Ordinal — Small, Med, Large
Zip Codes

3) Ratio — Small (10 oz) Med. (15 oz)

4) Interval (Range of values) — 90% – 100% → A
0 oz – 9.9 oz → $1.25 stamp

Mar 1-9:54 AM

Sampling Method:

1) Systematic : Every Kth item Selected
every 10th call recorded.

2) Stratified : Divide into groups,
Select few from each group.
16 Females (Select 5)
10 Males (Select 3)

3) Cluster : Divide into groups,
Select few groups,
Collect data from all members of those selected groups.
College offers 2000 classes.
Select 100 classes
Ask all students from these 100 classes to do a survey.

4) Random/ Convenience
"Least Reliable Method"

Mar 1-10:00 AM

Experiment vs observation

observation : observe (Notice) changes due to no action taken

Experiment : Notice changes due to action taken

Simple Random Sample : All outcomes have Same chance of Selection.

I select 1 student

$\frac{1}{26}$ chance of being Selected.

You flip a fair coin

H , T

SG 2

Mar 1-10:08 AM

Consider the Sample below

1 2 3 3 7

1) Sample Size $n = 5$

2) Min. 1 , Max = 7

3) Range = Max − Min = 7 − 1 = 6

4) Midrange = $\frac{\text{Max} + \text{Min}}{2} = \frac{7+1}{2} = \frac{8}{2} = 4$

5) Mode 3

6) $\sum x$ = Sum of data elements

Summation

$= 1 + 2 + 3 + 3 + 7 = \boxed{16}$

7) $\sum x^2 = 1^2 + 2^2 + 3^2 + 3^2 + 7^2$

$= 1 + 4 + 9 + 9 + 49 = \boxed{72}$

8) $\frac{\sum x}{n} = \frac{16}{5} = \boxed{3.2}$

9) $\frac{n\sum x^2 - (\sum x)^2}{n(n-1)} = \frac{5 \cdot 72 - 16^2}{5(5-1)}$

$= \frac{104}{20} = \boxed{5.2}$

10) $\sqrt{\text{Last Answer}} = \sqrt{5.2} = 2.280$

Round to 1-decimal 2.3

Round to whole 2

Round up to whole 3

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