

# Applied Probability and Statistics - C955

Saturday, May 22, 2021

6:55 AM

Need calculator

- 7 is a positive integer
- 1.6 is a rational number because it is a decimal whose expansion ends (in addition to being a real number).
- III is a positive integer (in addition to being a rational and real number)

greater than

less than

7

<

$2(3+4)$

$6+8=14$

$2 \times 7 = 14$

$$4^3 = 4 \times 4 \times 4 = 64$$

minus minus = + plus

$$7g(3h^2 - g)$$

$$7g \times 3h^2 - 7g \times g$$

$$21gh^2 - 7g^2$$

$$13g^3 - 7g^2 + 5g - 12$$

# of terms = 4

Constant = -12

What degree = 3

Coefficient of the  $g^2$  term = -7

$$-7a(5b+3)$$

$$-7a \times 5b + -7a \times 3$$

$$-35ab + -21a$$

$$2b + 3b = 5b \text{ (simplified)}$$

$$-4(x-3)$$

$$2b^2 + 3b = 2b^2 + 3b \text{ (simplified)}$$

$$-4(x-12)$$

$$5x + 3x + 7 - 2 = 8x + 5 \text{ (simplified)}$$

$$5x^2 + 9x - 2 + x^2 - x + 7 = 6x^2 + 8x + 5 \text{ (simplified)}$$

6

$$(3m+2) - \frac{(2n+6)}{2}$$

$$3m+2 -$$

$$\begin{array}{r} 15 \\ \times 350 \\ \hline \end{array}$$

$$5250$$

$$\begin{array}{r} 28 \\ 21 \\ \hline \end{array}$$

$$\begin{array}{r} 1 \quad 4 \\ 7 \quad 3 \\ \hline \end{array}$$

$$\begin{array}{r} 1 \quad 2 \quad 1 \quad 16 \\ 4 \quad 4 \quad 2 \\ \hline \end{array}$$

Adding a negative is the same as subtraction

Subtracting a negative is the same as adding

Multiplying positive # by Negative # the product will always be negative

Multiplying a negative by a negative the product will always be positive

even the negatives in a multi-step expression will lead to positive product

Dividing positive by negative the quotient will always be negative

Dividing negative by negative the quotient will be positive

Multiplying by a 0 = 0 always

Dividing by a 0 = Undefined

Any number with a 0 Exponent = 1

please

Parenthesis

124

714 28

excuse

Exponent

12

4

8

16

my

Multiplication

1234

15

20

30

60

Dear

Division

And

Addition

Sally

Subtraction

A composite has another factor other than 1

A prime has 2 factors 1 and itself



4 is composite

2 is prime

7 33

$$\sqrt{9} = 3 + (6.4)$$

$$3 = 3 \times 24$$

$$1 + 25$$

$$8 \div 4$$

$$9 + 12 \div 3$$

$$4$$

$$\sqrt{(9+16)} + 2 \cdot 3 =$$

$$25$$

$$5 \quad 6 \quad 11 \quad 5-6 = 2 \quad 3$$

interval - a set of numbers between to specified values

integer - A number, (positive, negative or zero) that can be represented without a fractional or a decimal component

Multiplying a negative by a negative the product will always be positive

$$125 - 200$$

$$\frac{4}{9} \div \frac{1}{6} = \frac{3}{18}$$

$$\frac{5}{18}$$

$$\frac{7}{10} \div \frac{12}{25}$$

$$\frac{7 \times 25}{10 \times 12} = \frac{175}{120}$$

$$55/120$$

$$\frac{4}{9} \div \frac{1}{6}$$

$$\frac{4 \times 1}{9 \times 6} = \frac{4}{54}$$

$$\frac{3}{8} \div \frac{1}{16}$$

$$\frac{3 \times 16}{8 \times 1} = \frac{48}{8}$$

$$1 \div \frac{3}{5}$$

$$\frac{5}{5} \times \frac{5}{3}$$

$$\frac{25}{15} = \frac{5}{3}$$

1 gallon (gal) = 4 quarts

1 quart = 2 pints

1 pint = 2 cups

1 cup = 8 fluid ounces

1 fluid ounce = 2 tablespoons

1 tablespoon = 3 teaspoons

1 gallon

Cup	Cup	Quart
Cup	Cup	
Pint		Quart
Pint		

$$\text{Fahrenheit} = \text{Celsius} \times \frac{9}{5} + 32$$

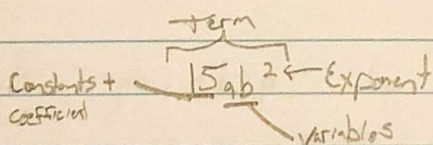
$$\text{Celsius} = (\text{Fahrenheit} - 32) \times \frac{5}{9}$$

Subtraction is the inverse of addition

addition is the inverse of subtraction

multiplication is the inverse of division

division is the inverse of multiplication





# Combining Like Terms

9=1 or when 00 #

$$4x + 6x = 10x$$

$$9y - 3y = 6y$$

$$\frac{3}{4} \div \frac{2}{3}$$

1.05, 3.6, 3.17, 2.2

$$\frac{3 \times 3}{4 \times 2} = \frac{9}{8}$$

10.02

~~19/88~~

4 3

12 4 2 1 2 3

$$x - \frac{5^{15}}{4^{13}} = \frac{2^{15}}{3^{13}}$$

14 6 5 3

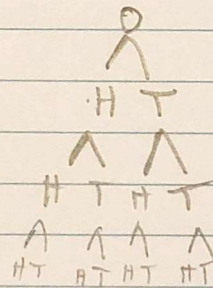
$$-\frac{15}{12} = \frac{6}{9} - \frac{11}{3}$$

~~32/88~~ ~~16/44~~ ~~4/11~~

10 20 10 12

mean and deviation?

40	36	76	12
	22	54	
	21	34	
	20	32	
	19	13	



rp6 pb cb pr bp

1

Quantitative includes # of employees or salary

Qualitative includes the type of industry or occupational titles

Quantitative aka numerical data

Qualitative aka Categorical data

Customer experience is considered categorical


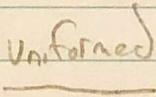



Graphical display for categorical data = pie charts + Bar charts

Graphical displays for Quantitative data = Dot plots, Stem plots

Box plots and histograms

Type of display	Type of data	Useful to display
Dot plot	Quantitative	outliers, gaps, clusters
Stem plot	Quantitative	data according to place value
Box plot	Quantitative	center, spread, + outliers
histogram	Quantitative	Shape and spread

symmetric Distribution where the peak is pronounced AKA Bell curve

 Skewed-Right	 Uniform
 Skewed-Left	 bi/multi modal
 U Shaped	

reliable data is both consistent and repeatable



Mean = Average

Median = halfway point of a set of values not grouped

Mode = value that occurs most often in a data set

4 7 9 11 16 21 25 25 31 33 39 40

Range is the difference between the smallest and greatest ~~it~~

Quartiles are values that divide a data set into 4 groups

Interquartile range measures the difference between the third quartile and the first (second + 3rd)

$$\frac{3}{4} \div \frac{2}{3}$$
$$\frac{3}{4} \times \frac{3}{2} = \frac{9}{8} = 1\frac{1}{8}$$

$$x - \frac{5}{4} = \frac{2}{3}$$

$$x = \frac{2}{3} + \frac{5}{4}$$

$$\frac{8}{12} + \frac{15}{12} = \frac{23}{12}$$

- Discrete Data - has distinct values, can be counted, has unconnected points
- Continuous Data - has values within a range, measured not counted, does not have gaps between data points
- Days of the week are examples of discrete data
- Expressions - A group of symbols such as numbers and operators that has mathematical validity
- Commutative - the order in which the numbers appear in the sum can be reversed

Quantitative variable - Height age weight Revenue Exam score

Categorical variable - genders, months of the year, zip codes

Street names?

Categorical

Speed of car?

Quantitative

Salary

400

Quantitative?

Social Security?

Categorical

46 Correlation coefficient

✓ Fit the line  
remember slope  
quality of fit  $\uparrow \rightarrow$

43 Causation

✓

Simpsons paradox ✓

Linear Inequalities ✓

Algebraic and Linear Expressions ✓

Coordinate Plane ✓

Numerical measures mean of 25 and deviation of 2

Sample spaces and Events

mean - How much would each  $x$  equal

median - How much is the  $x$  in the middle?

mode - Which is the most common  $x$ ?

$$\begin{array}{r} 2x + 377 \\ -3 \quad -3 \end{array}$$

$$\begin{array}{r} 3x74 \\ 2 \quad 2 \end{array}$$

$$\begin{array}{r} \leftarrow 8 \rightarrow \\ x72 \end{array}$$

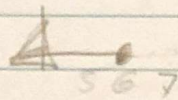


$$\frac{1}{3}x + 4 \leq 6$$

$$\quad \quad -4$$

$$x \quad \frac{1}{3}x \leq 2$$

$$x \leq 6$$



$$5 - 3x \geq -4$$

$$\quad \quad -5 \quad \quad -5$$

$$\quad \quad -3x \geq -9$$

$$\quad \quad +3 \quad \quad -6$$



$$2x - 17 \geq 7$$

$$\quad \quad +1$$

$$\hline 2x \quad 8$$

$$x \geq 4$$

$$\text{or } -3x + 2 \geq -1$$

$$\quad \quad -2 \quad \quad -2$$

$$\quad \quad -3x \geq -3$$

$$x \leq 1$$

$$-12 < 7x - 5$$

$$+5 \quad \quad +5$$

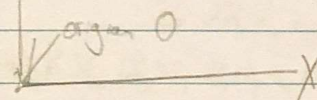
$$-7 < 7x$$

$$-1 < x \leq 2$$

$$y$$

$$x \quad y$$

$$(3, 5)$$



5

9, 10, 11

Correlation coefficient vs Standard deviation

$$\frac{3}{4} \div \frac{2}{3} = \frac{3}{4} \times \frac{3}{2} = \frac{9}{8}$$

1.05, 3.6, 3.17 and 2.2

$$X - \frac{5}{4} = \frac{2}{3} + \frac{5}{4}$$
$$+ \frac{5}{4} = \frac{8}{12} + \frac{15}{12} = \frac{23}{12}$$

2 tablespoons 1 ounce

$$8 - 1.5$$

$$x + \frac{5}{3} = \frac{2}{3}$$

$$-\frac{5}{3} \quad \frac{2}{3} \quad -\frac{5}{3} \quad -\frac{3}{3}$$

$$2y + 6 > 20$$

$$-6$$

$$> 14$$

$$y > 7$$

$$4y - 6 > 18$$

$$+6$$

$$> 24$$

$$y > 6$$

$$y = 3x + 5$$

$$y = -2x + 9$$

$$9y = 2x - 9$$

12 4 2 12 3

Mean = average

$$Y = 0.216X + 19.85$$

40 5

0  
H T  
H T  
H T H T  
H T H T H T  
H T H T H T

36, 22, 21, 20, 19

13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23

$\frac{1}{2}$

50,000 60,000

H H H, H H, H T H, T H H, H T T, T H T, T T H, T T T

$\frac{4}{8}$

1 2 3  
T F T F T F

$\frac{2}{6}$   $\frac{1}{3}$

T T F  
T T F  
T T T  
T T T  
T T F  
T T F



60 05/00  
61 7

1 2 3 4 5 6

^

1 2 3 4 5 6

37

20 T

$\frac{1}{3}$  12 B

17%

16%

2%

88 56

M

F

50%

-33

A B C A B C

8

$\frac{32}{88}$

$\frac{4}{11}$

R P B  
^ ^ ^  
P B R B R P

21

62

60

Wind stress = 20%

Physics = 27

Chem = 21%

Earth Science = 31%

End of Module test

Hypothesis = suggested possible outcome to test

Force = Mass  $\times$  Acceleration

