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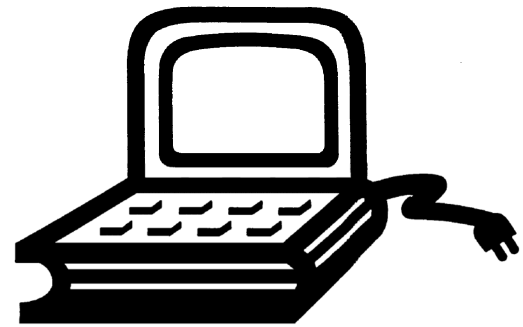

Math 150 – Fall 2019
Algebra & Trigonometry

Charles Rubenstein, Ph. D.
Professor of Information Science

Session 2: Monday 9/9/19

6:30pm - 9:20pm

PMC 402

Not Permitted in Class

Be sure to have all cellphones **OFF**

150-01 Class Seating Chart – Mondays

	S1	S2	S3	S4	S5	S6	S7	S8
R3		Jesus		Alex		Natt		(Joey)
R2				Emanie	Matt			
R1				Steve		Atara		

Instructor

MONDAY 6:30pm

REVISED Schedule: Math 150 – Fall 2019 – PMC 402

Monday	Notes
26-Aug	1. Introduction: Numbers, Arithmetic Operations, Fractions
2-Sep	NO CLASSES – Labor Day
9-Sep	2. Manipulation of Algebraic Expressions
16-Sep	3. Solving Linear and Quadratic Equations of One Variable
23-Sep	4. *1st Take Home Exam Distributed;* Solving Equations of Two Variables
30-Sep	NO CLASSES – Instructor Holiday
7-Oct	5. *Take Home Exam DUE;* Creating Equations – Polynomial Functions
14-Oct	6. Polynomial Functions, continued; *1st Exam Review*
21-Oct	7. Functions, Graphing, Exponents and Logarithms
28-Oct	8. Trigonometric Functions, Pythagorean Theorem
4-Nov	CM/FM Seminar / 9. Applications of Trigonometry
11-Nov	10. Analytic Trigonometry: Identities & Graphing; *Take Home Exam*
18-Nov	11. Areas and Volumes of Geometric Solids; *2nd Exam Due*
25-Nov	12. Systems of Equations and Inequalities; *2nd Exam Review*
2-Dec	13. Series and Sequences, Review topics
9-Dec	Final Examination (3-hour)

Instructor Contact Information

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Professor of Engineering & Information Science

Brooklyn Faculty Office: ARC G-49

Pratt Manhattan Campus – PMC 402

Fall 2019 Office hours

- Mondays: **4:00-5:00pm ARC; 5:30-6:30pm PMC**
- Tuesdays: **5:00-6:00pm ARC**

*(*Please email me at least a day in advance if you plan on coming to office hours…)*

Send me an email … crubenst@pratt.edu

Subject line: Math

This Class Session

- ***Due:*** ***Textbook readings***
- ***Lecture: Manipulation of Algebraic Expressions***
- ***Due & Review:*** ***Homework Set #01***

***In class* – Session 3:**

- ***Due*** ***Textbook readings***
- ***Due & Review:*** ***Homework Set #02***
- ***Lecture: Solving Linear and Quadratic Equations of One Variable***
- ***Quiz #01 in class***

***In class* – Session 4:**

- ***Due & Review:*** ***Homework Set #03***
- ***Lecture: Solving Equations of Two Variables***
- ***Quiz #02 in class***

Class Session Archives

www.CharlesRubenstein.com/150

/19fa02.pdf (*this slide set*)*

/19fa02_h.pdf (*slide set as handouts*)*

**Available by Thursday evenings…*

Math 150 – Chapter Topics

1. **The Foundations of Algebra**
2. **Equations and Inequalities**
3. **Functions**
4. **Polynomial Functions**
5. **Rational Functions and Conic Sections**
6. **Exponential and Logarithmic Functions**
7. **The Trigonometric Functions**
8. **Analytic Trigonometry**
9. **Applications of Trigonometry**
10. **Systems of Equations and Inequalities**
11. **Matrices, Linear Systems, and Determinants**
12. **Topics in Algebra**

Nomenclature

In today's class we will discuss:

- Algebraic Expression
- Polynomial Expression
- Argument
- Equation
- Inequality
- Radical Sign
- Absolute Value
- Magnitude

Chapter 1 - Page 12, Problem 60

Revisiting…

Paying attention to rounding errors

60. An alloy is 3/8 copper, 5/12 zinc, and the balance lead. How much lead is there in 282 pounds of alloy?

Ch1, Pg12, Problem 60 - Ans

60. An alloy is 3/8 copper, 5/12 zinc, and the balance lead. How much lead is there in 282 pounds of alloy?

Equation is: (3/8 + 5/12) + x = 1

a. 3/8 • 3 → 9/24 and 5/12 • 2 → 10/24

thus, 19/24 + x = 1 and x_{lead} = 5/24 = 0.208*

b. 282 lbs • 0.208 = 58.656 lbs lead in the alloy

Final Answer: *58.656 pounds*

**Using a calculator to find decimals and not using conversion to the lowest common denominator: (0.375 + 0.417) = 0.792 and thus, again x_{lead} = 0.208*

BUT is this the correct answer? See next slide…

Answers to 'n' decimal places

x_{lead} = 5/24 Using 5/24 = 0.2083333333333 …

We get 282 lbs • 0.2083333333333 … = **58.75 lbs**

Which is what we would get using fractions and NOT a calculator: (5/24) 282 = 235/4 = **58 ¾ lbs**.

*Using **0.208** we get **58.656** pounds, and*

*using **0.21*** we get ***59.22*** *pounds;* ***THEREFORE***

As both the 3 decimal place and 2 decimal place answers are approximations,

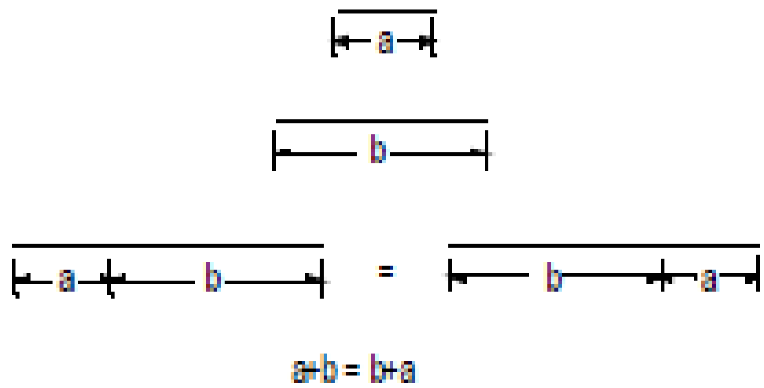
UNLESS told to use a truncated amount, DON'T!

Questions?

Chapter 1 – Part 2
The Foundations of Algebra

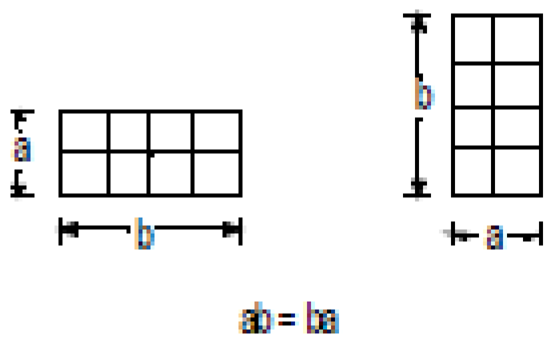
1.3 Algebraic Expressions & Polynomials
1.4 Factoring
1.5 Rational Expressions
1.6 Integer Exponents ***(review on your own)***
1.7 Rational Exponents and Radicals

“Laws” - 1



Commutative Law of Addition:

a + b = b + a (the order doesn’t matter)



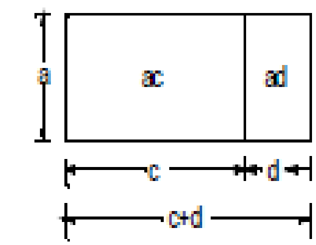
Commutative Law of Multiplication:

ab = ba (the order doesn’t matter)

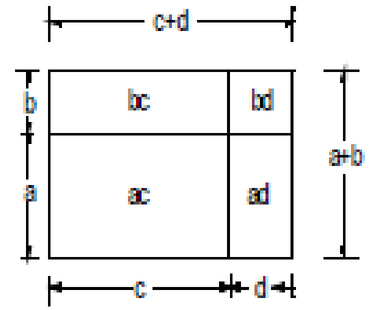
“Laws” - 2

Associative Law of Addition

a + (b+c) = (a +b) +c



(a)(c+d) = ac + ad



(a+b)(c+d) = ac +bc + ad +bd

Associative Law of Multiplication:

a(b+c) = ab + bc

Division does not commute: a/b … b/a ***unless b = a.***

Associative Law of Division:

(a+b)/c = (a /c) + (b/c) but a / (b +c) … (a/b) + (a /c)

Positive and '0' Exponents

a^2** means **$a \cdot a$

***a^3** means **$a \cdot a \cdot a$**, and so forth.*

The superscripts 2 and 3 are known as exponents.

If we multiply ***a^2** by **a^3** we have*

$a^2 \cdot a^3 = (a \cdot a) \times (a \cdot a \cdot a) = a \cdot a \cdot a \cdot a \cdot a = a^5$

when a number raised to an exponent is multiplied by the same number raised to a different exponent, in the product the exponents add.

Note that $a^1 = a$

What about ZERO exponents:

Using this rule, $a^n \cdot a^0 = a^{n+0} = a^n$.

*Therefore **$a^0 = 1$.***

Any number raised to the zeroth power is equal to one ("unity").

Negative and Fractional Exponents

Negative exponents:

using the rule for multiplication; $a^n \bullet a^{-n} = a^0 = 1$

For this equation to be true, we see that $a^{-n} = 1/a^n$

Fractional exponents:

The multiplication rule gives us; $a^{1/2} \bullet a^{1/2} = a$.

Since $a^{1/2}$ *times itself is* equal to a,

we see that $a^{1/2} = \sqrt{a}$ = *the square root of* a

Likewise, $a^{1/3}$ is the cube root of a, *etc.*

Graphing Calculator Alert

Calculator Alert

Your calculator evaluates exponents using a special key, which may be labeled $\boxed{x^y}$, $\boxed{y^x}$, or $\boxed{\wedge}$.

Example: $(1 \div 2)\boxed{x^y}3 = 0.125$

or $(1 \div 2)\boxed{y^x}3 = 0.125$

or $(1 \div 2)\boxed{\wedge}3 = 0.125$

WARNING
Note the difference between

$$(-3)^2 = (-3)(-3) = 9$$

and

$$-3^2 = -(3 \cdot 3) = -9$$

We will use $\boxed{x^y}$ or $\boxed{\wedge}$ to indicate the exponentiation key in this text.

In addition to the exponentiation key, your calculator probably has a special key labeled $\boxed{x^2}$.

Examples: $(-3)\boxed{x^2} = 9$

$-3\boxed{x^2} = -9$

Fractional Exponent Problems

This lets us understand an expression such as $\mathbf{3.3}^{1.48}$

which means $(3.3^{1})(3.3^{0.4})(3.3^{0.08}) =$

$(3.3)(3.3^{1/10})^{4}(3.3^{1/100})^{8}$

Note however, that we do not have to break it down this way to evaluate it;

we can enter $\mathbf{3.3}^{1.48}$ *directly into a calculator*

to find $3.3^{1.48} = 5.853$ *:*

3 . 3 ^ 1 . 4 8 <enter>

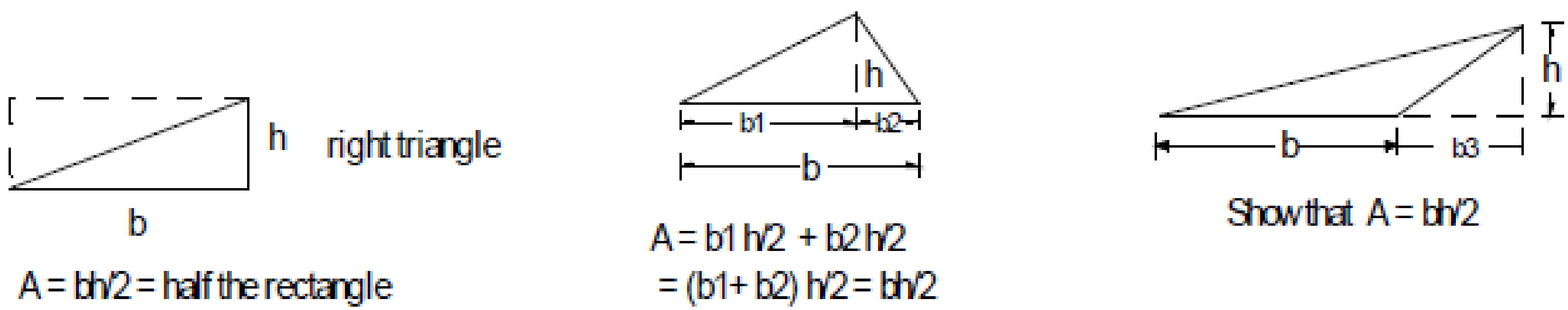
Result: 5.853297943

Questions?

Geometry Review - 1

Area of a triangle: A = 1/2 base x height

The triangle's apex doesn't have to lie above the base



A formula can be derived for the **area** of an arbitrary triangle in terms of the lengths of the three sides x, y, and z:

$$A = \frac{1}{4}\sqrt{2x^2y^2 + 2y^2z^2 + 2z^2x^2 - x^4 - y^4 - z^4}$$

Geometry Review - 2

Circles and Spheres

Circumference of a circle:

$$C = 2\pi r$$ *(contains radius length to the 1st power)*

Area of a circle:

$$A = \pi r^2$$ *(contains radius length to the 2nd power)*

Area of a sphere:

$$A = 4\pi r^2$$ *(contains radius length to the 2nd power)*

Volume of a sphere:

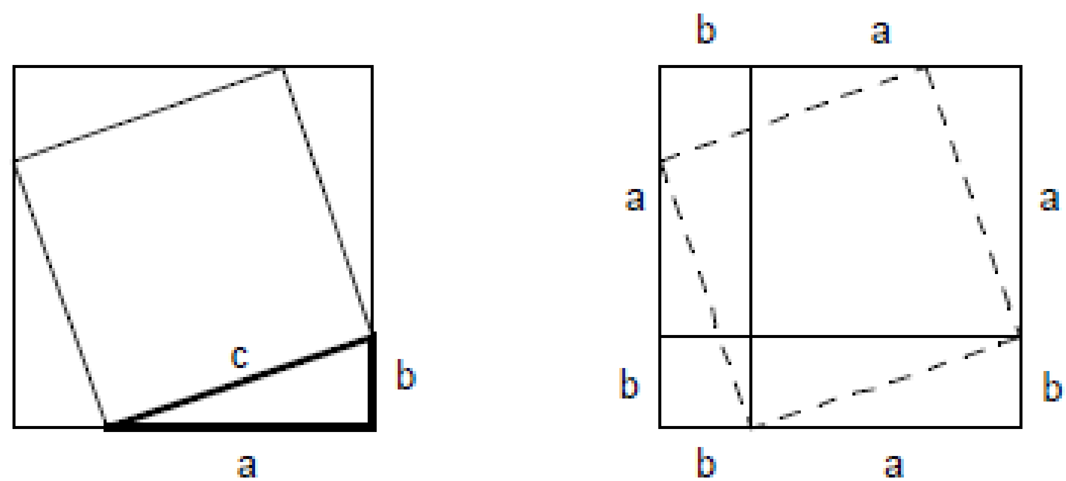
$$V = (4/3) \cdot \pi r^3$$ *(contains radius length to the 3rd power)*

Perfect Right Triangles - 1

The Pythagorean Theorem:

The sum of the squares of the sides

equals the square of the hypotenuse…



$$c^2 + 2ab = a^2 + b^2 + 2ab$$

Subtract 2ab from each side of the equation:

$$a^2 + b^2 = c^2$$

Perfect Right Triangles - 2

There is a recipe to find perfect right triangles:

Pick any two integers **i** *and* **j**, *where* $\mathbf{i > j}$.

The sides of the triangle are $\mathbf{i^2+j^2}$, $\mathbf{i^2-j^2}$, *and* **2ij**

Example: i =2, j=1. Then the hypotenuse = $i^2 + j^2 =$ **5**,

and the two sides are: $i^2 - j^2 =$ **3** , and 2ij = **4**

The simplest perfect right triangle has sides 3, 4, and 5.

(Note that $3^2 + 4^2 = 5^2$*)*

Two other perfect right triangles are **5, 12, 13** and **8, 15, 17**.

(*check them*)

Problem to work out on your own:

Use algebra to verify this recipe, that is, show that

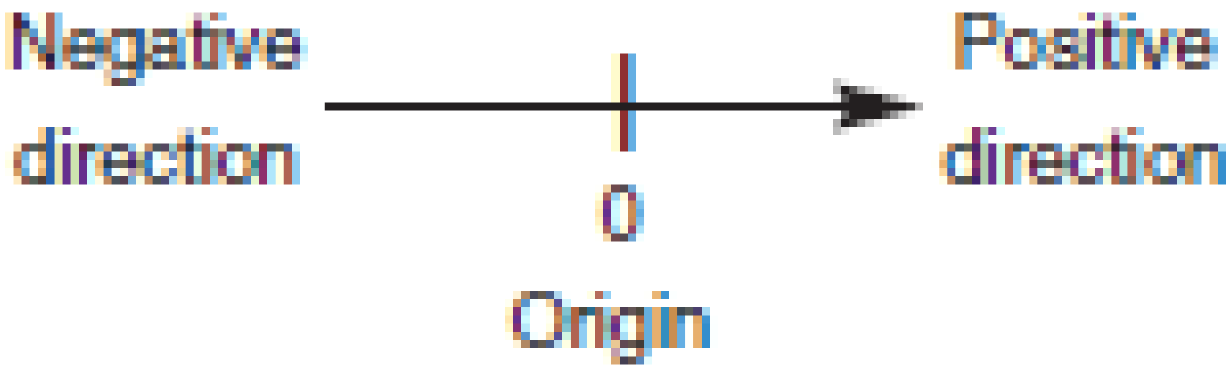
$$(i^2-j^2)^2 + (2ij)^2 = (i^2+j^2)^2$$

Chapter 1.2

The Real Number Line

The Real Number Line

- Concept



- Example

Inequalities

Symbol	Meaning
$<$	Less than
$>$	Greater than
$\leq$	Less than or equal to
$\geq$	Greater than or equal to

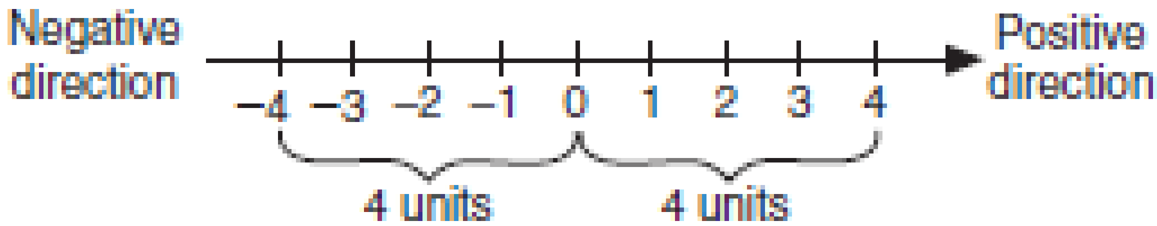
Algebraic Expression	Meaning	Equivalent Statement	Geometric Statement
$a > 0$	a is greater than 0.	a is positive.	a lies to the right of the origin.
$a < 0$	a is less than 0.	a is negative.	a lies to the left of the origin.
$a > b$	a is greater than b.	$a - b$ is positive.	a lies to the right of b.
$a < b$	a is less than b.	$a - b$ is negative.	a lies to the left of b.
$a \geq b$	a is greater than or equal to b.	$a - b$ is positive or zero.	a lies to the right of b or coincides with b.
$a \leq b$	a is less than or equal to b.	$a - b$ is negative or zero.	a lies to the left of b or coincides with b.

Properties of Inequalities

Example	Algebraic Expression	Property
Either $2 < 3$, $2 > 3$, or $2 = 3$.	Either $a < b$, $a > b$, or $a = b$.	Trichotomy property
Since $2 < 3$ and $3 < 5$, then $2 < 5$.	If $a < b$ and $b < c$ then $a < c$.	Transitive property
Since $2 < 5$, then $2 + 4 < 5 + 4$ or $6 < 9$.	If $a < b$ then $a + c < b + c$.	The sense of an inequality is preserved if any constant is added to both sides.
Since $2 < 3$ and $4 > 0$, then $2(4) < 3(4)$ or $8 < 12$.	If $a < b$ and $c > 0$, then $ac < bc$.	The sense of an inequality is preserved if it is multiplied by a positive constant.
Since $2 < 3$ and $-4 < 0$, then $2(-4) > 3(-4)$ or $-8 > -12$.	If $a < b$ and $c < 0$, then $ac > bc$.	The sense of an inequality is reversed if it is multiplied by a negative constant.

Absolute Values

- Distance on a line from -4 to +4:



- Definition of the Absolute Value:

$$|a| = \begin{cases} a & \text{if } a \geq 0 \\ -a & \text{if } a < 0 \end{cases}$$

$$|-4| + |+4| = 4 + 4 = 8$$

(NOT a subtraction!)

Graphing Calculator Alert

Graphing Calculator Alert

Your calculator may have an absolute value key, usually labeled ABS. If you have a graphing calculator, it is important to use parentheses when you use this key.

Examples:

a. $ABS(5 - 2)$

b. ABS(2 − 5)

c. ABS(3 − 5) − ABS(8 − 6)

d. ABS(4 − 7) ÷ (−6)

Basic Properties of Absolute Value

Example	Algebraic Expression	Property
$\lvert -2 \rvert \geq 0$	$\lvert a \rvert \geq 0$	Absolute value is always nonnegative.
$\lvert 3 \rvert = \lvert -3 \rvert = 3$	$\lvert a \rvert = \lvert -a \rvert$	The absolute values of a number and its negative are the same.
$\lvert 2 - 5 \rvert = \lvert -3 \rvert = 3$ $\lvert 5 - 2 \rvert = \lvert 3 \rvert = 3$	$\lvert a - b \rvert = \lvert b - a \rvert$	The absolute value of the difference of two numbers is always the same, irrespective of the order of subtraction.
$\lvert (-2)(3) \rvert = \lvert -2 \rvert \lvert 3 \rvert = 6$	$\lvert ab \rvert = \lvert a \rvert \lvert b \rvert$	The absolute value of a product is the product of the absolute values.

Chapter 1.3

Algebraic Expressions and Polynomials

Algebraic Expressions

"You invest p dollars at 6% simple annual interest for 1 year.

How much do you now have?"

- Variables (p)
- Constants (0.06)
- Algebraic Operations (+, - , /, x)
- Resultant (?)

Resulting in…

$$\mathbf{p + 0.06p = ?} \quad \text{or} \quad \mathbf{p(1 + 0.06) = ?}$$

Polynomials

Polynomials are equations of the form:

$$\mathbf{P = a_n x^n + a_{n-1} x^{n-1} + a_{n-2} x^{n-2} + \ldots\ a_1 x^1 + a_0}$$

where:

Coefficients $\mathbf{a_{n-1}}$ are constant real numbers

$\mathbf{a_n \neq 0}$ **a** = real # **n** = nonnegative integer

$\mathbf{P_{n-a}}$ term = $\mathbf{(a_{n-a} x^{n-a})}$

Degree of a Polynomial

The degree of a polynomial is the exponent value of the highest monomial with a nonzero coefficient:

$x + y$	← Degree 1
xy	← Degree 2
$2x^2y + y^2 - 3xy + 1$	← Degree 3
$3x^4 + xy - y^3$	← Degree 4

Polynominals are equal if all terms are equal

Questions?

Chapter 1.4
Factoring

Common Factors

$$x^2 + x = x\,(x + 1)$$

$$2xy + 2 = 2\,(xy + 1)$$

$$25x^3 - 10x^2 = 5x^2\,(5x - 2)$$

$$3x^4 + x^3 + xy = x\,(3x^3 + x^2 + y)$$

Factoring by Grouping

GIVEN: $2ab + b + 2ac + c$

Grouping b, c: $2ab + b + 2ac + c$

Common factors b,c:

$$b\,(2a+1) + c(2a+1)$$

Common factors (2a+1):

$(2a+1)\,(b+c)$ **= *final answer***

Factoring 2^{nd} Degree Polynomials

GIVEN: $x^2 - 7x + 10$

Constant is positive, middle term is negative; 2 @ -

Integer Pairs product=10: 1 & 10; 2 & 5

Factoring:

$$(x-2)\,(x-5)$$

GIVEN: $x^2 – 9$ ***(difference of squares)***

$$(x+3)\,(x-3)$$

In general; $a^2-b^2 = (a+b)(a-b)$

Sum/Difference of Cubes

GIVEN: Sum of cubes:

$$a^3+b^3$$

$$= (a+b)(a^2-ab+b^2)$$

GIVEN: Difference of cubes:

$$a^3-b^3$$

$$= (a-b)(a^2+ab+b^2)$$

"MAGICAL" Factoring for Second-Degree Polynomials

Factoring involves a certain amount of trial and error that can become frustrating, especially when the lead coefficient is not 1. We demonstrate the method for the polynomial $4x^2 + 11x + 6 = ?$ *Eq. 1*

(1) Using the lead coefficient of 4, write the pair of incomplete factors

$$(4x \pm ?)\ (4x \pm ?) \qquad \textit{Eq. 2}$$

(2) Next, multiply the coefficient of x^2 *and the constant term in Equation (1) to produce 4 • 6 = 24. Now find two integers whose product is 24 and whose sum is 11, the coefficient of the middle term of (1). Since 8 and 3 work, and all signs are +, we can write*

$$(4x + 8)(4x + 3) \qquad \textit{Eq. 3}$$

Finally, within each parenthesis discard any common numerical factor. (Discarding a factor may only be performed in this "magical" type of factoring.) Thus (4x + 8) reduces to (x + 2) and we write

$$(x + 2)(4x + 3) \qquad \textit{Eq. 4}$$

which is the factorization of 4x2 + 11x + 6

Irreducible Polynomials

Prime or irreducible polynomials cannot be written as a product of two polynomials of positive degree…

Examples:

$$x^2+1$$

$$x^2+x+1$$

knowing these makes it easier to know when to 'stop' factoring…

Questions?

Chapter 1.5
Rational Expressions

Rational Expressions

The reciprocal of (b/a) equals (a/b)

Multiplication of rational expressions

$$\frac{a}{b} \cdot \frac{c}{d} = \frac{ac}{bd}$$

The Rule of 'One': a/a = 1; [d/c / d/c] =1

$$\frac{\frac{a}{b}}{\frac{c}{d}} = \frac{\frac{a}{b}}{\frac{c}{d}} \cdot \frac{\frac{d}{c}}{\frac{d}{c}} = \frac{\frac{a}{b}\,\frac{d}{c}}{\frac{c}{d}\,\frac{d}{c}} = \frac{a}{b}\,\frac{d}{c}$$

Cancellation

Cancel the 4 and x:

$$\frac{4xy}{4yz} = \frac{x}{z}$$

Cancel the $(2x^2+3)$ term:

$$\frac{(2x^2+3)(4x^3+4)}{(7x^7+1)(2x^2+3)} = \frac{(4x^3+4)}{(7x^7+1)}$$

Add/Subtract Fractions

Multiplying by '1' (7/7, 3/3)

$$\frac{2}{3}+\frac{1}{7} = \frac{2}{3}\,\frac{7}{7}+\frac{1}{7}\,\frac{3}{3} = \frac{14}{21}+\frac{3}{21} = \frac{17}{21}$$

Multiplying by '1' (**7/7, (b+6)/(b+6)**)

$$\frac{2a+5}{b+6}+\frac{a-4}{7} = \frac{2a+5}{b+6}\,\frac{7}{7}+\frac{a-4}{7}\,\frac{b+6}{b+6} =$$

$$\frac{7(2a+5) + (a-4)(b+6)}{7(b+6)}$$

Cross Multiplication

Multiply the left-hand numerator by the right-hand denominator and visa versa

GIVEN: $\frac{x}{y} = \frac{a}{b}$

This is the same as: $xb = ya$

Chapter 1.6

Integer Exponents

review on your own…

Chapter 1.7

Rational Exponents and Radicals

Properties of Powers & Roots

For $a^n = b$ and $a = b^{1/n}$ for $n>0$

Example ***Property***

$2^3 = 8$	$(-2)^3 = -8$	Any power of a real number is a real number.
$8^{1/3} = 2$	$(-8)^{1/3} = -2$	The odd root of a real number is a real number.
$0^n = 0$	$0^{1/n} = 0$	A positive power or root of zero is zero.
$4^2 = 16$	$(-4)^2 = 16$	A positive number raised to an even power equals the negative of that number raised to the same even power.
$(16)^{1/2} = 4$		The principal root of a positive number is a positive number.
$(-4)^{1/2}$ is undefined in the real number system.		The even root of a negative number is not a real number.

Pg 58

Properties of Radicals

Example	*Property*
$\sqrt[3]{8^2} = (\sqrt[3]{8})^2 = 4$	$\sqrt[n]{b^m} = (\sqrt[n]{b})^m$
$\sqrt{4}\sqrt{9} = \sqrt{36} = 6$	$\sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$
$\frac{\sqrt[3]{8}}{\sqrt[3]{27}} = \sqrt[3]{\frac{8}{27}} = \frac{2}{3}$	$\frac{\sqrt[n]{a}}{\sqrt[n]{b}} = \sqrt[n]{\frac{a}{b}}$
$\sqrt[3]{(-2)^3} = -2$	$\sqrt[n]{a^n} = a$ if n is odd
$\sqrt{(-2)^2} = \lvert -2 \rvert = 2$	$\sqrt[n]{a^n} = \lvert a \rvert$ if n is even

In Class Problems

More Difficult Problems

If you take out a mortgage for $49,000 for 10 years at an interest rate of 5.25%, how much is the monthly payment?

where ***m is the monthly payment,***

P is the original principal (49,000),

I is the interest rate (0.0525),

and ***Y is the number of years (10)***

This problem is much more difficult,

but still within the scope of this course

$$m := \frac{P \cdot \frac{I}{12}}{1 - \left(1 + \frac{I}{12}\right)^{-12 \cdot Y}}$$

The answer is m = $625.73

Quick Problems

Ch. 1.1, Pg 12 (5^{th} 11) #63.

A woman's take-home pay is $210.00 after deducting 18% withholding tax. What is her pay before the deduction?

You have 5 minutes to solve this

18% is deducted from 100% pay leaving 100% – 18% = 82% for net pay. Thus, 210 is 82% of her gross earnings:

210 = 0.82x

x = 210/0.82 = **$256.10** *(note the '$' in the answer…)*

This is the question type where Net = (%) Gross.

To find the amount of tax: Gross – Net = Tax

Quick Problems

Ch. 1.1, Pg 12 (5^{th} 11) #66.

Eric starts at a certain time driving his car from New York to Philadelphia going 50 mph. Sixty minutes later, Steve leaves in his car en route from Philadelphia to New York going 40 mph.

When the two cars meet, which one is nearer to New York?

You have 1 minute to solve this

Although we could put a timeline to try to show where the vehicles are at time t=60minutes, etc., when the cars meet they are BOTH the same distance from both NY and Philly.

This was a trick question…

Quick Problems

Ch. 1.3, Pg 29 (5th 28) #60. Perform the indicated operation:

$$5(2x - 3)^2$$

You have 3 minutes to solve this

$$= 5\,(2x - 3)\,(2x - 3)$$

$$= 5(4x^2 - 12x + 9)$$

$$= (20x^2 - 60x + 45) \text{ final answer}$$

Quick Problems

Ch. 1.3, Pg 29 (5^{th} 28) #62. Perform the indicated operation:

$$(x - 1)(x + 2)(x + 3)$$

You have 3 minutes to solve this

$$= (x^2 + x - 2)(x + 3)$$

$$= x^2 (x + 3) + x (x + 3) - 2 (x + 3)$$

$$= x^3 + 3x^2 + x^2 + 3x - 2x - 6$$

$$= x^3 + 4x^2 + x - 6 \quad \textit{final answer}$$

Quick Problems

Ch. 1.3, Pg 29 (5th 28) #63 An investor buys *x shares of IBM stock at* \$98 per share at Thursday's opening of the stock market. Later in the day, the investor sells *y shares of AT&T stock at \$38 per* share and *z shares of TRW stock at \$20 per* share. Write a polynomial that expresses the amount of money the buyer has invested at the end of the day.

You have 3 minutes to solve this

pays for IBM stock: $-98x$

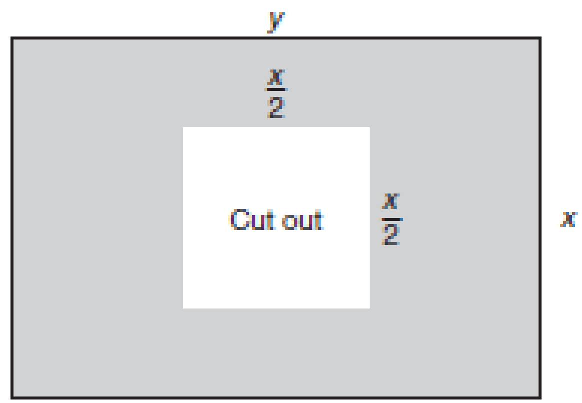
sells AT&T stock: $+\ 38y$

sells TRW stock: $+\ 20z$

INVESTMENT = - 98x + 38y +20z final answer

Quick Problems

Ch. 1.3, Pg 30 (5th 28) #64. *An artist takes a rectangular piece of cardboard whose sides are x and y and cuts out a square of side x/2 to obtain a mat for a painting, as shown in Figure 5. Write a polynomial giving the area of the mat.*



You have 3 minutes to solve this

$\text{Area}_{mat} = \text{Area}_{outer} - \text{Area}_{inner}$

$= xy - (x/2)(x/2)$

$= xy - (x/2)^2$

$= xy - (x^2/4)$ *final answer*

Quick Problems

Ch. 1.3, Pg 30 (5th 28) #73. *Perform the multiplication mentally:*

$$(3x - 1)^2$$

You have 2 minutes to solve this

$$= (3x - 1)(3x - 1)$$

$$= 9x^2 - 3x - 3x + 1$$

$$= 9x^2 - 6x + 1 \quad \textit{final answer}$$

Quick Problems

Ch. 1.3, Pg 30 (5th 28) #74.

Perform the multiplication mentally:

$$(x + 2)\ (x - 2)$$

You have 2 minutes to solve this

$$(x + 2)\ (x - 2) = x(x - 2) + 2(x - 2)$$

$$= x^2 - 2x + 2x - 4$$

$= x^2 - 4$ (difference of squares) final ans.

Homework Set #02*

Section 1.3 (Expressions and Polynomials)

Page 28 (5^{th} 27): Problems 4, 27, 42, 44, 49, 50, 58, 82

Section 1.4 (Factoring)

Page 38 (5^{th} 36): Problems 2, 9, 11, 12, 13, 32, 40

Section 1.5 (Rational Expressions)

Page 47 (5^{th} 44): Problems 1, 2, 7, 8, 25, 32, 51, 52

Section 1.7 (Rational Exponents and Radicals)

Page 67 (5^{th} 63): Problems 1, 5, 6, 19, 20

**All homework assignments are on the class website*

Topics in Session 3

Ch. 1 The Foundations of Algebra

- **1.8 Complex Numbers**
- **Chapter 1 Review**

Ch. 2 Equations and Inequalities

- **2.1 Linear Equations in One Unknown**
- **2.2 Applications: From Words to Algebra**

In Class Session 03

- ***Due:* Textbook readings**
- ***Due & Review:* Homework Set #02**
- ***Lecture:* Solving Linear and Quadratic Equations of One Variable**
- ***Quiz #01 in class***

In class **– Session 4 REVISED:**

- ***Distributed:* First Take Home Exam**

    (due via scan, in an email, not later than 6pm Sunday 6 October, and followed up by hard copy in class on Monday 7 October)

- ***Due & Review:* Homework Set #03**
- ***Lecture:* Solving Equations of Two Variables**
- ***Quiz #02 in class***

Any Questions?
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End