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College Algebra, 9th Ed. [open all | close all]

- R-Basic Algebra Operations
  - Section R.1
    - Integers and rational numbers
    - Rational and irrational numbers
    - Properties of real numbers
    - Simple addition and subtraction of signed fractions
    - Signed fraction multiplication: Advanced
  - Section R.2
    - Exponents and integers: Problem type 1
    - Exponents and integers: Problem type 2
    - Evaluating expressions with exponents of zero
    - Evaluating numbers with negative exponents
    - Product rule of exponents
    - Multiplying monomials
    - Product rule of exponents in a multivariate monomial
    - Quotient rule with negative exponents
    - Introduction to the power rule of exponents
    - Power rule with positive exponents
    - Power rule with negative exponents: Problem type 1
    - Power rule with negative exponents: Problem type 2
    - Using the power and product rules to simplify expressions with positive exponents
    - Using the power, product, and quotient rules to simplify expressions with negative exponents
    - Converting between decimal numbers and numbers written in scientific notation
    - Cube root of an integer
    - Square root simplification
    - Square root of a perfect square monomial
    - Simplifying a radical expression: Problem type 1
    - Simplifying a radical expression: Problem type 2
    - Square root addition
    - Square root multiplication
    - Simplifying a product of radical expressions using the distributive property
    - Rationalizing the denominator of a radical expression

- Rationalizing the denominator of a radical expression using conjugates
- Simplifying a higher radical: Problem type 1
- Simplifying a higher radical: Problem type 2
- Rationalizing the denominator of a higher index radical with variables
- Rational exponents: Basic
- Rational exponents: Negative exponents and fractional bases
- Rational exponents: Products and quotients
- Rational exponents: Powers of powers
- Converting between radical form and exponent form

Section R.3

- Degree and leading coefficient of a polynomial in one variable
- Combining like terms: Advanced
- Simplifying a sum or difference of polynomials
- Multiplying binomials: Problem type 1
- Squaring a binomial
- Multiplying binomials: Problem type 2
- Multiplying binomials: Problem type 3
- Multiplying polynomials
- Greatest common factor of two monomials
- Factoring a quadratic with leading coefficient 1
- Factoring a quadratic with leading coefficient greater than 1
- Factoring a quadratic polynomial in two variables
- Factoring a difference of squares
- Factoring with repeated use of the difference of squares formula
- Factoring a sum or difference of two cubes
- Factoring out a monomial from a polynomial: Problem type 1
- Factoring out a monomial from a polynomial: Problem type 2
- Factoring a product of a quadratic trinomial and a monomial
- Factoring a multivariate polynomial by grouping: Problem type 1
- Factoring a multivariate polynomial by grouping: Problem type 2
- Factoring out a binomial from a polynomial

Section R.4

- Adding rational expressions with different denominators: x+a, x+b
- Adding rational expressions with different denominators: Quadratic

- Simplifying a ratio of polynomials: Problem type 1
- Simplifying a ratio of polynomials: Problem type 2
- Multiplying rational expressions: Problem type 1
- Multiplying rational expressions: Problem type 2
- Dividing rational expressions: Problem type 1
- Dividing rational expressions: Problem type 2
- Complex fraction: Problem type 3
- Complex fraction: Problem type 4
- Quotients of expressions involving exponents

Chapter R Supplementary Topics

- Operations with absolute value
- Exponents and order of operations
- Complex fractions without variables: Problem type 2
- Simplifying a polynomial expression
- Multiplying a monomial and a polynomial: Problem type 1
- Multiplying and dividing numbers written in scientific notation
- Least common multiple of two monomials
- Adding rational expressions with common denominators
- Adding rational expressions with different denominators: Multivariate
- Adding rational expressions with different denominators: ax, bx
- Complex fraction: Problem type 1
- Simplifying a sum of radical expressions
- Simplifying a product of radical expressions
- Special products with square roots: Conjugates and squaring unchecked
- Simplifying products or quotients of higher index radicals with different indices

1-Equations and Inequalities

Section 1.1

- Solving a linear equation with several occurrences of the variable: Problem type 3
- Solving a linear equation with several occurrences of the variable: Problem type 4
- Solving a linear equation with several occurrences of the variable: Problem type 5
- Solving equations with zero, one, or infinitely many solutions
- Algebraic symbol manipulation: Problem type 1
- Algebraic symbol manipulation: Problem type 2
- Solving a word problem using a linear equation: Problem type 1

- Solving a word problem using a linear equation: Problem type 2
- Solving a word problem using a linear equation: Problem type 3
- Word problem involving area and perimeter of a rectangle
- Word problem on percentage: Problem type 2
- Solving a percent mixture problem using a linear equation
- Solving a rate problem using a linear equation
- Solving a rational equation that simplifies to a linear equation: Problem type 1
- Solving a rational equation that simplifies to a linear equation: Problem type 2
- Solving a rational equation that simplifies to a linear equation: Problem type 3
- Solving a rational equation that simplifies to a linear equation: Problem type 4
- Word problem involving multiple rates
- Solving a word problem using a rational equation

Section 1.2

- Ordering integers
- Solving a linear inequality: Problem type 2
- Solving a linear inequality: Problem type 3
- Solving a linear inequality: Problem type 4
- Solving a compound linear inequality: Problem type 1
- Word problem with linear inequalities: Problem type 1
- Word problem with linear inequalities: Problem type 2
- Set builder and interval notation
- Union and intersection of intervals

Section 1.3

- Solving an equation involving absolute value: Basic
- Solving an inequality involving absolute value: Basic
- Solving an inequality involving absolute value

Section 1.4

- Using i to rewrite square roots of negative numbers
- Simplifying a product or quotient involving roots of negative numbers
- Adding and subtracting complex numbers
- Multiplying complex numbers
- Dividing complex numbers
- Simplifying a power of i

Section 1.5

- [x] Evaluation of a linear expression in two variables
- [x] Evaluation of a polynomial in one variable
- [x] Finding the roots of a quadratic equation with leading coefficient 1
- [x] Finding the roots of a quadratic equation with leading coefficient greater than 1
- [x] Solving a rational equation that simplifies to a quadratic equation: Problem type 1
- [x] Solving a rational equation that simplifies to a quadratic equation: Problem type 2
- [x] Even root property
- [x] Solving an equation with exponent using the even-root property
- [x] Completing the square
- [x] Solving a quadratic equation by completing the square
- [x] Solving a quadratic equation using the quadratic formula
- [x] Discriminant of a quadratic equation
- [ ] Discriminant of a quadratic equation with parameter unchecked
- [x] Solving a word problem using a quadratic equation with rational roots
- [x] Solving a word problem using a quadratic equation with irrational roots
- [x] Solving equations written in factored form
- [ ] Solving a quadratic equation with complex roots
- [x] Section 1.6
  - [x] Solving an equation with radicals: Problem type 1
  - [x] Solving an equation with radicals: Problem type 3
  - [x] Solving an equation with radicals: Problem type 4
  - [x] Solving equations that can be written in quadratic form: Problem type 1
  - [x] Solving equations that can be written in quadratic form: Problem type 2
- Chapter 1 Supplementary Topics
  - [x] Solving a linear equation with several occurrences of the variable: Problem type 2
  - [x] Solving a word problem using a linear equation: Problem type 4
  - [x] Simple interest
  - [x] Solving a value mixture problem using a linear equation added (in 10022)
  - [ ] Finding the value for a new score that will yield a given mean
  - [ ] Solving a word problem with 3 unknowns using a linear equation
  - [ ] Solving a compound linear inequality: Problem type 2
  - [ ] Union and intersection of finite sets
  - [x] Simple absolute value equation
  - [x] Solving an equation involving absolute value: Advanced
  - [x] Solving an equation with radicals: Problem type 2

- [ ] Solving an equation with a root index greater than 2
- [x] Solving an equation with positive rational exponent
- [ ] Solving a quadratic equation needing simplification
- [x] Solving a rational equation that simplifies to a quadratic equation: Problem type 3
- [x] Pythagorean Theorem
- [x] Area of a triangle
- [x] Circumference and area of a circle
- [ ] Circumference ratios
- [ ] Area between two rectangles
- [ ] Area between two concentric circles
- [ ] Area involving rectangles and circles
- [ ] Area involving inscribed figures
- [ ] Volume of a cube or a rectangular prism
- [ ] Volume of a triangular prism
- [ ] Volume of a cylinder
- [ ] Rate of filling of a solid
- [ ] Volume of a sphere
- [ ] Surface area of a cube or a rectangular prism
- [ ] Surface area of a triangular prism
- [ ] Surface area of a cylinder
- [ ] Surface area of a sphere
- [x] Similar polygons Added (in 10022, 10023)
- [ ] Indirect measurement

2-Graphs

- [ ] Section 2.1
  - [x] Plotting a point in the coordinate plane
  - [x] Graphing a line given its equation in slope-intercept form
  - [ ] Testing an equation for symmetry about the axes and origin
  - [x] Graphing a parabola: Problem type 1
- [ ] Section 2.2
  - [ ] Midpoint of a line segment in the plane
  - [ ] Distance between two points in the plane
  - [ ] Graphing a circle given its equation in standard form
  - [ ] Graphing a circle given its equation in general form

- Writing an equation of a circle given its center and a point on the circle
- Writing an equation of a circle given the endpoints of a diameter
- Section 2.3
  - Solving a word problem using a linear equation: Problem type 3
  - Graphing a line given its equation in slope-intercept form
  - Graphing a line given its equation in standard form
  - Graphing a line through a given point with a given slope
  - Graphing a vertical or horizontal line
  - Finding x- and y-intercepts of a line given the equation in standard form
  - Finding slope given the graph of a line on a grid
  - Finding slope given two points on the line
  - Finding the slope of a line given its equation
  - Writing an equation of a line given the y-intercept and a point
  - Writing the equation of a line given the slope and a point on the line
  - Writing the equation of the line through two given points
  - Writing the equations of vertical and horizontal lines through a given point
  - Writing equations and drawing graphs to fit a narrative
  - Slopes of parallel and perpendicular lines: Problem type 1
  - Slopes of parallel and perpendicular lines: Problem type 2
- Section 2.4
  - Application problem with a linear function: Problem type 1 unchecked (not in core math)
  - Application problem with a linear function: Problem type 2
- Chapter 2 Supplementary Topics
  - Interpreting the graphs of two functions
  - Choosing a graph to fit a narrative

3-Functions

- Section 3.1
  - Identifying functions from relations
  - Determining whether an equation defines a function
  - Vertical line test
  - Evaluating functions: Problem type 1
  - Variable expressions as inputs of functions Uncheck (in 11010)
  - Domain and range from ordered pairs
  - Domain of a square root function Uncheck (in 11010)

- [ ] Finding the domain of a fractional function involving radicals
- [ ] Finding a difference quotient for a function
- [x] Finding inputs and outputs of a function from its graph
- [ ] Section 3.2
  - [ ] Evaluating a piecewise-defined function
  - [x] Domain of a rational function
  - [ ] Finding intercepts and zeros of a function given the graph
  - [ ] Finding x- and y-intercepts of the graph of a nonlinear equation
  - [ ] Finding where a function is increasing, decreasing, or constant given the graph
  - [ ] Domain and range from the graph of a continuous function
  - [ ] Domain and range from the graph of a piecewise function
  - [ ] Graphing a piecewise-defined function
- [ ] Section 3.3
  - [ ] Even and odd functions
  - [ ] Writing an equation for a function after a vertical translation
  - [ ] Writing an equation for a function after a vertical and horizontal translation
  - [x] Translating the graph of a function: One step
  - [x] Translating the graph of a function: Two steps
  - [x] Transforming the graph of a function by reflecting over an axis
  - [x] Transforming the graph of a function by shrinking or stretching
  - [x] Graphing a parabola: Problem type 1
  - [ ] Graphing a simple cubic function
  - [ ] Graphing a function involving a square root
  - [ ] Graphing an equation involving absolute value in the plane
  - [x] Graphing a parabola: Problem type 2 Added (in 10023)
- [ ] Section 3.4
  - [ ] Range of a quadratic function
  - [x] Finding the maximum or minimum of a quadratic function
  - [x] Word problem using the maximum or minimum of a quadratic function
  - [x] Finding the x-intercept(s) and the vertex of a parabola
  - [ ] Rewriting a quadratic function to find the vertex of its graph
  - [ ] Graphing a parabola: Problem type 3 unchecked (in 11010)
  - [ ] Graphing a parabola: Problem type 4
  - [x] How the leading coefficient affects the shape of a parabola

- Writing the equation of a quadratic function given its graph
- Solving a quadratic inequality written in factored form
- Solving a quadratic inequality
- Section 3.5
  - Sum, difference, and product of two functions
  - Quotient of two functions
  - Combining functions: Advanced
  - Composition of two functions: Domain and range
  - Composition of two functions: Basic
  - Composition of two functions: Advanced
  - Expressing a function as a composition of two functions
- Section 3.6
  - Horizontal line test
  - Determining whether two functions are inverses of each other
  - Inverse functions: Problem type 1
  - Inverse functions: Problem type 2
  - Inverse functions: Problem type 3
- Chapter 3 Supplementary Topics
  - Evaluating functions: Problem type 2
  - Finding the average rate of change of a function
  - Finding local maxima and minima of a function given the graph
  - Transforming the graph of a function using more than one transformation
  - Using a graphing calculator to find the vertex and x-intercepts of a quadratic function
  - Classifying the graph of a function

4-Polynomial and Rational Functions

- Section 4.1
  - Polynomial long division: Problem type 1
  - Polynomial long division: Problem type 2
  - Polynomial long division: Problem type 3
  - Synthetic division
  - Using the remainder theorem to evaluate a polynomial
  - The Factor Theorem
  - Determining the end behavior of the graph of a polynomial function
  - Using a graphing calculator to find zeros of a polynomial function

- Using a graphing calculator to find local extrema of a polynomial function
- Inferring properties of a polynomial function from its graph
- Section 4.2
  - Using a graphing calculator to solve a word problem involving a polynomial of degree 3
  - Using a graphing calculator to solve a word problem involving a local extremum of a polynomial function
  - Solving a polynomial inequality
- Section 4.3
  - Finding zeros of a polynomial function written in factored form
  - Finding a polynomial of a given degree with given zeros: Real zeros
  - Using a given zero to write a polynomial as a product of linear factors: Real zeros
  - Finding all possible rational zeros using the rational zeros theorem: Problem type 1
  - Finding all possible rational zeros using the rational zeros theorem: Problem type 2
  - Using the rational zeros theorem to find all zeros of a polynomial: Rational zeros
  - Using the rational zeros theorem to find all zeros of a polynomial: Irrational zeros
  - Multiplying expressions involving complex conjugates
  - Finding a polynomial of a given degree with given zeros: Complex zeros
  - Using a given zero to write a polynomial as a product of linear factors: Complex zeros
  - Using the rational zeros theorem to find all zeros of a polynomial: Complex zeros
  - Using the conjugate zeros theorem to find all zeros of a polynomial
  - Matching graphs with polynomial functions
- Section 4.4
  - Domain of a rational function
  - Finding the asymptotes of a rational function: Problem type 1
  - Finding the asymptotes of a rational function: Problem type 2
  - Sketching the graph of a rational function: Problem type 1
  - Sketching the graph of a rational function: Problem type 2
  - Graphing rational functions with holes
  - Matching graphs with rational functions: Two vertical asymptotes
  - Writing the equation of a rational function given its graph
  - Solving a rational inequality: Problem type 1
  - Solving a rational inequality: Problem type 2
- Section 4.5
  - Writing an equation that models variation
  - Word problem on direct variation

- Word problem on inverse variation
- Word problem on combined variation
- Chapter 4 Supplementary Topics
  - Finding x- and y-intercepts given a polynomial function
  - Remainder theorem: Advanced
  - Descartes' Rule of Signs
  - Linear factors theorem and conjugate zeros theorem

5-Exponential and Logarithmic Functions

- Section 5.1
  - Solving an exponential equation: Problem type 2
  - Solving a word problem using an exponential equation: Problem type 1
  - Solving a word problem using an exponential equation: Problem type 3
  - Compound interest
  - Sketching the graph of an exponential function: Basic
  - The graph, domain, and range of an exponential function
  - Sketching the graph of an exponential function: Advanced
- Section 5.2
  - Evaluating an exponential function that models a real-world situation
  - Solving a word problem using an exponential equation: Problem type 3
- Section 5.3
  - Converting between logarithmic and exponential equations
  - Converting between natural logarithmic and exponential equations
  - Evaluating a logarithmic expression
  - Basic properties of logarithms
  - Writing expressions as a single logarithm
  - Expanding a logarithmic expression: Problem type 1
  - Change of base for logarithms: Problem type 1
  - Solving a logarithmic equation: Problem type 1
  - Sketching the graph of a logarithmic function: Basic
  - The graph, domain, and range of a logarithmic function
  - Translating the graph of a logarithmic or exponential function
- Section 5.5
  - Solving a logarithmic equation: Problem type 2
  - Solving a logarithmic equation: Problem type 3

- Solving a logarithmic equation: Problem type 4
- Solving a logarithmic equation: Problem type 5
- Solving an exponential equation: Problem type 1
- Solving an exponential equation: Problem type 3
- Using a graphing calculator to solve an exponential or logarithmic equation
- Solving a word problem using an exponential equation: Problem type 2
- Solving a word problem using an exponential equation: Problem type 4

Chapter 5 Supplementary Topics

- Expanding a logarithmic expression: Problem type 2
- Change of base for logarithms: Problem type 2
- Domain of a logarithmic function: Advanced
- Sketching the graph of a logarithmic function
- Solving an exponential equation: Problem type 4

6-Additional Topics in Analytic Geometry

Section 6.1

- Graphing a parabola with a horizontal or a vertical axis

Section 6.2

- Graph of an ellipse centered at the origin

Section 6.3

- Graph of a hyperbola centered at the origin

Chapter 6 Supplementary Topics

- Writing an equation of a parabola given the vertex and the focus
- Finding the focus of a parabola
- Graphing an ellipse given its equation in standard form
- Graphing an ellipse given its equation in general form
- Finding the foci of an ellipse
- Writing an equation of an ellipse given the foci and the major axis length
- Writing an equation of an ellipse given the center, an endpoint of an axis, and the length of the other axis
- Graphing a hyperbola given its equation in standard form
- Graphing a hyperbola given its equation in general form
- Finding the foci of a hyperbola
- Writing an equation of a hyperbola given the foci and the vertices
- Writing an equation of a hyperbola given the foci and the asymptotes
- Classifying conics given their equations

7-Systems of Equations and Matrices; Additional Topics

- Section 7.1
  - Classifying systems of linear equations from graphs
  - Graphically solving a system of linear equations
  - Solving a simple system using substitution
  - Solving a system of linear equations
  - Solving a system that is inconsistent or consistent dependent
  - Solving a system of 3 equations in 3 unknowns
  - Solving a word problem using a system of linear equations: Problem type 1
  - Solving a word problem using a system of linear equations: Problem type 2
  - Solving a word problem using a system of linear equations: Problem type 3
  - Solving a word problem using a system of linear equations: Problem type 4 necessary?
  - Solving a word problem using a system of linear equations: Problem type 5
  - Solving a word problem using a 3 by 3 system of linear equations
- Section 7.2
  - Gauss-Jordan elimination with a 2x2 matrix
  - Augmented matrix and solution set of a system of linear equations
- Section 7.3
  - Scalar multiplication of a matrix
  - Addition and subtraction of matrices
  - Linear combinations of matrices
  - Multiplication of matrices: Basic
  - Multiplication of matrices: Advanced
- Section 7.4
  - Finding the inverse of a 2x2 matrix
  - Finding the inverse of a 3x3 matrix
  - Using the inverse of a matrix to solve a system of linear equations
- Section 7.5
  - Finding the determinant of a 2x2 matrix
  - Finding the determinant of a 3x3 matrix
  - Cramer's rule: Problem type 1
  - Cramer's rule: Problem type 2
- Section 7.6
  - Solving a system of nonlinear equations
  - Using a graphing calculator to solve a system of equations

- Section 7.7
  - Translating sentences into inequalities
  - Graphing a linear inequality in the plane: Problem type 1
  - Graphing a linear inequality in the plane: Problem type 2
  - Graphing a linear inequality in the plane: Problem type 3
  - Graphing a system of linear inequalities
  - Solving a word problem using a system of linear inequalities
- Section 7.8
  - Linear programming
  - Solving a word problem using linear programming
- Chapter 7 Supplementary Topics
  - Solutions to a linear equation in two variables: Problem type 2
  - Creating an inconsistent system of linear equations
  - Consistency and independence of a system of linear equations
  - Graphing a quadratic inequality: Problem type 1
  - Graphing a quadratic inequality: Problem type 2
  - Graphing a system of nonlinear inequalities: Problem type 1
  - Graphing a system of nonlinear inequalities: Problem type 2

8-Sequences, Induction, and Probability

- Section 8.1
  - Finding the first terms of a sequence
- Section 8.3
  - Arithmetic and geometric sequences: Identifying and writing in standard form
  - Arithmetic sequences
  - Geometric sequences
  - Sum of the first n terms of an arithmetic sequence
  - Sum of the first n terms of a geometric sequence
  - Sum of a geometric series
- Section 8.4
  - Factorial expressions
  - Introduction to permutations and combinations
  - Permutations and combinations: Problem type 1
  - Permutations and combinations: Problem type 2
  - Permutations and combinations: Problem type 3

- Section 8.5
  - Probabilities of draws with replacement
  - Probabilities of draws without replacement
  - Outcomes and event probability
  - Die rolling
- Section 8.6
  - Binomial formula
- Chapter 8 Supplementary Topics
  - Probability of intersection or union: Word problems
  - Independent events: Basic
  - Probability of union: Basic
  - Intersection and conditional probability
  - Venn diagrams: Two events
  - Venn diagrams: Word problems
- Appendix B-Special Topics
  - Section B.2
    - Partial fraction decomposition with distinct linear factors
    - Partial fraction decomposition with repeated linear factors
    - Partial fraction decomposition with an irreducible quadratic factor

Caution: You may have removed too many lower-level topics from the course; this is not usually recommended.

For students who have not yet mastered lower-level topics, learning/reviewing these topics is essential for success in learning more advanced topics that are central to the course. We recommend that you put some of these topics back into the course, even though they are only review for the core topics.

The ALEKS Assessment determines the exact topics each student already knows, doesn't know, and is ready to learn. Only those students who need to work on a given topic will be asked to do so. Students who have already mastered topics (including prerequisite topics) will not be prompted to learn them again.

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