ALEKS®
Algebra 2

Correlation of the ALEKS course Algebra 2 to the Alabama Course of Study for Algebra II

Number and Operations

- = ALEKS course topic that addresses the standard

1: Determine the relationships among the subsets of complex numbers.

- Integers and rational numbers
- Rational and irrational numbers

2: Simplify expressions involving complex numbers, using order of operations and including conjugate and absolute value.

- Adding and subtracting complex numbers
- Multiplying complex numbers
- Dividing complex numbers
- Simplifying a power of i

Algebra

- = ALEKS course topic that addresses the standard

3: Analyze families of functions, including shifts, reflections, and dilations of y = k/x (inverse variation), y = kx (direct variation/linear), y = x^2 (quadratic), y = a^x (exponential), and y = log$_a$x (logarithmic).

- **Identifying the domain and range of a relation given its graph, a table of values, or its equation, including those with restricted domains**
- **Identifying real-world situations corresponding to families of functions**

  - Graphing a line given its equation in slope-intercept form
  - Graphing a line given its equation in standard form
  - Writing an equation and drawing its graph to model a real-world situation
  - Domain and range from ordered pairs
  - Domain and range from the graph of a continuous function
  - Domain and range from the graph of a piecewise function
  - Writing an equation for a function after a vertical translation
  - Writing an equation for a function after a vertical and horizontal translation
  - Translating the graph of a function: One step
  - Translating the graph of a function: Two steps
  - Transforming the graph of a function by reflecting over an axis
  - Transforming the graph of a function by shrinking or stretching
  - Transforming the graph of a function using more than one transformation

- Graphing a parabola of the form $y = ax^2$
- Graphing a simple cubic function
- Graphing an equation involving absolute value in the plane: Advanced
- Range of a quadratic function

- Graphing a parabola of the form $y = (x-a)^2 + c$

- Graphing a parabola of the form $y = ax^2 + bx + c$: Integer coefficients
- Classifying the graph of a function
- How the leading coefficient affects the shape of a parabola
- Domain of a square root function
- Graphing a function involving a square root
- Sketching the graph of an exponential function: Basic
- The graph, domain, and range of an exponential function
- 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
- Domain of a rational function
- Sketching the graph of a rational function: Problem type 1
- Graphing rational functions with holes
- Word problem on direct variation
- Word problem on inverse variation

4: Determine approximate real zeros of functions graphically and numerically and exact real zeros of polynomial functions.

- **Using completing the square, the zero product property, and the quadratic formula**

  - Finding the roots of a quadratic equation with leading coefficient 1
  - Finding the roots of a quadratic equation with leading coefficient greater than 1
  - Solving a quadratic equation needing simplification
  - Applying the quadratic formula: Exact answers
  - Finding the x-intercept(s) and the vertex of a parabola
  - Rewriting a quadratic function to find the vertex of its graph
  - Solving equations written in factored form
  - Roots of a product of polynomials

5: Identify the characteristics of quadratic functions from their roots, graphs, or equations.

- **Writing an equation when given its roots or graph**
- **Graphing a function when given its equation**
- **Determining the nature of the solutions of a quadratic equation**
- **Determining the maximum or minimum values of quadratic functions both graphically and algebraically**

  - Graphing a parabola of the form $y = ax^2$
  - Writing a quadratic equation given the roots and the leading coefficient
  - Discriminant of a quadratic equation
  - Finding the x-intercept(s) and the vertex of a parabola
  - Rewriting a quadratic function to find the vertex of its graph
  - Finding the maximum or minimum of a quadratic function

  - Graphing a parabola of the form $y = (x-a)^2 + c$

- Graphing a parabola of the form $y = ax^2 + bx + c$: Integer coefficients
- Writing the equation of a quadratic function given its graph

6: Perform operations on functions, including addition, subtraction, multiplication, division, and composition.

- **Determining the inverse of a function or a relation**
- **Performing operations on polynomial and rational expressions containing variables**
- **Constructing graphs by analyzing their functions as sums or differences**

  - Simplifying a sum or difference of two univariate polynomials
  - Simplifying a sum or difference of three univariate polynomials
  - Multiplying a monomial and a polynomial: Univariate with positive leading coefficients
  - Multiplying binomials with leading coefficients of 1
  - Multiplying conjugate binomials: Univariate
  - Multiplying binomials in two variables
  - Squaring a binomial: Univariate
  - Multiplication involving binomials and trinomials in two variables
  - Dividing a polynomial by a monomial: Univariate
  - Polynomial long division: Problem type 1
  - Polynomial long division: Problem type 2
  - Polynomial long division: Problem type 3
  - Sum, difference, and product of two functions
  - Quotient of two functions
  - Composition of two functions: Basic
  - Composition of two functions: Domain and range
  - Inverse functions: Problem type 1
  - Inverse functions: Problem type 2
  - Inverse functions: Problem type 3
  - 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
  - Adding rational expressions with common denominators
  - Adding rational expressions with different denominators: ax, bx
  - Adding rational expressions with different denominators: Multivariate
  - Adding rational expressions with different denominators: x+a, x+b
  - Adding rational expressions with different denominators: Quadratic
  - Complex fraction: Problem type 1
  - Complex fraction: Problem type 3

7: Solve equations, inequalities, and applied problems involving absolute values, radicals, and quadratics over the complex numbers, as well as exponential and logarithmic functions.

- **Solving equations using laws of exponents, including rational and irrational exponents**
- **Expressing the solution of an equation, inequality, or applied problem as a graph**

on a number line or by using set or interval notation

- Simple absolute value equation
- Solving an equation involving absolute value: Basic
- Solving an equation involving absolute value: Advanced
- Solving an inequality involving absolute value: Basic
- Solving an inequality involving absolute value
- Solving a quadratic equation using the square root property: Problem type 1
- Solving a quadratic equation using the square root property: Problem type 2
- Solving a word problem using a quadratic equation with rational roots
- Solving a word problem using a quadratic equation with irrational roots
- Word problem using the maximum or minimum of a quadratic function
- Solving a quadratic inequality written in factored form
- Solving a quadratic inequality
- Graphing a quadratic inequality: Problem type 1
- Graphing a quadratic inequality: Problem type 2
- Solving a quadratic equation with complex roots
- Solving a radical equation that simplifies to a linear equation: One radical, basic
- Solving a radical equation that simplifies to a linear equation: Two radicals
- Solving a radical equation that simplifies to a quadratic equation: One radical
- Solving a radical equation that simplifies to a quadratic equation: Two radicals
- Solving an equation with a root index greater than 2
- Odd root property
- Solving an equation with exponent using the odd-root property
- Solving an equation with positive rational exponent
- Solving an equation with negative rational exponent
- Evaluating an exponential function that models a real-world situation
- Solving a logarithmic equation: Problem type 1
- 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 2
- Solving an exponential equation: Problem type 3
- Solving a word problem using an exponential equation: Problem type 1
- Solving a word problem using an exponential equation: Problem type 2
- Solving a word problem using an exponential equation: Problem type 3
- Solving a word problem using an exponential equation: Problem type 4

8: Solve systems of linear equations or inequalities in two variables using algebraic techniques, including those involving matrices.

- ### Evaluating the determinant of a 2x2 or 3x3 matrix
- ### Solving word problems involving real-life situations

- Solving a simple system using substitution
- Solving a system of linear equations using elimination with multiplication and addition
- Solving a system that is inconsistent or consistent dependent
- Solving a word problem involving a sum and another simple relationship using a system of linear equations
- Solving a value mixture problem using a system of linear equations
- Solving a distance, rate, time problem using a system of linear equations
- Solving a percent mixture problem using a system of linear equations
- Solving a tax rate or interest rate problem using a system of linear equations

- Solving a word problem using a system of linear inequalities
- Finding the determinant of a 2x2 matrix
- Finding the determinant of a 3x3 matrix
- Cramer's rule: Problem type 1
- Gauss-Jordan elimination with a 2x2 matrix

Geometry

- = ALEKS course topic that addresses the standard

9: Solve coordinate geometry problems using algebraic techniques.

- Finding slope given the graph of a line on a grid
- Finding slope given two points on the line
- Midpoint of a line segment in the plane
- Distance between two points in the plane

Data Analysis and Probability

- = ALEKS course topic that addresses the standard

10: Use different forms of representation to compare characteristics of data gathered from two populations.

- **Evaluating the appropriateness of the design of an experimental study**
- **Describing how sample statistics reflect values of population parameters**

  Topic covered in ALEKS PreCalculus

11: Determine an equation of linear regression from a set of data

- **Examining data to determine if a linear or quadratic relationship exists and to predict outcomes**

  - Scatter plots and correlation

12: Calculate probabilities of events using the laws of probability.

- **Using permutations and combinations to calculate probabilities**
- **Calculating conditional probability**
- **Calculating probabilities of mutually exclusive events, independent events, and dependent events**

  - Outcomes and event probability
  - Probability of independent events
  - Probability of dependent events
  - Probabilities of draws with replacement
  - Probabilities of draws without replacement
  - Independent events: Basic

- Conditional probability: Basic