MATH 101: College Algebra
Course Standards and Skills
Spring 2016

The list below identifies our course standards. For example, one standard is "R-5. Factoring Essentials." Each standard has several individual skills listed. Your performance on a group of skills will be combined to determine if your performance on that standard merits a grade of "Proficient" or "Not Proficient." Your scores for each standard will be displayed in OAKS as "Pass" or "Fail".

R-1. Real Numbers

- ✓ I can perform operations on sets.
- ✓ I can classify numbers as natural, integer, whole, irrational, rational, real.
- ✓ I can evaluate and simplify arithmetic expressions without the use of a calculator.

R-2. Algebra Essentials

- ✓ I can convert between interval notation, inequality notation, and graphical notation for subsets of real numbers. (*Note:* Interval notation will be defined in Section 1-5.)
- ✓ I can evaluate algebraic expressions and determine domains.
- ✓ I can use the laws of exponents, including those involving roots.

R-3. Geometry Essentials

- ✓ I can use the Pythagorean Theorem and its converse.
- ✓ I know and can apply geometry formulas related to squares, triangles, circles, boxes, spheres, and right circular cylinders.
- ✓ I can use properties of congruent triangles and similar triangles to solve problems.

R-4. Polynomial Essentials

- ✓ I can characterize polynomials as monomials, binomials, trinomials. I can write polynomials in standard form, identify their degree, and describe coefficients.
- ✓ I can perform operations on polynomials, including addition, subtraction, multiplication, and (long) division.
- ✓ I can state and apply the formulas for the squares of binomials and the cubes of binomials. I can state and apply the formulas for the difference of two cubes and the sum of two cubes.

R-5. Factoring Essentials

- ✓ I can factor polynomials using a variety of techniques.
- ✓ I can complete the square of a polynomial expression.

R-7. Rational Expressions

- ✓ I can perform algebraic operations on rational expressions, including reducing to lowest terms, addition, subtraction, multiplication, and division.
- ✓ I can simplify complex rational expressions.

R-8. *n*th Roots and Rational Exponents

- ✓ I can simplify expressions involving *n*th roots. I can simplify expressions involving rational exponents.
- ✓ I can rationalize the denominator or numerator of a given expression.

1-1. Linear Equations

- ✓ I can solve linear equations in one variable.
- ✓ I can model situations using linear equations and use the model to form conclusions.

1-2. Quadratic Equations

- ✓ I can solve quadratic equations using a variety of methods, including factoring, completing the square, and using the quadratic formula.
- ✓ I can model situations using quadratic equations and use the model to form conclusions.

1-4. Radical Equations and Equations Quadratic in Form

- ✓ I can solve radical equations and equations quadratic in form.
- ✓ I can use factoring to solve quadratic-like equations.

1-5. Solving Inequalities (*Note*: Converting between inequality, interval, and graphical notation appears in standard R-2.)

- ✓ I can use properties of inequalities to simplify, to solve inequalities, and to combine inequalities. I can graph solution sets on the real line.
- ✓ I can model real-world problems using inequalities and form conclusions using the model.

1-6. Absolute Value Equations and Inequalities

- ✓ I can solve equations involving absolute value.
- ✓ I can solve inequalities involving absolute value.

2-1. The Distance and Midpoint Formulas

- ✓ I know the distance formula and can apply it when appropriate.
- ✓ I know the midpoint formula and can apply it when appropriate.

2-2. Graphs of Equations

- ✓ I can graph equations. I can find intercepts from a graph or from an equation.
- ✓ I can test an equation for symmetry with respect to the *x*-axis, the *y*-axis, and the origin. I can identify symmetry from a graph or complete a graph so that it has a given type of symmetry.
- ✓ I can quickly and accurately graph each of the following basic equations, describing any intercepts or symmetry: $y = x^2$, $y = x^3$, $y = x$, $y = 1/x$, $y = \sqrt{x}$, $x = y^2$

2-3. Lines

- ✓ I can find the equation of a line given its slope and a point. I can find the equation of a line given its slope and its *y*-intercept. I can find the equation of a line given two points on the line. I can find equations of parallel lines. I can find equations of

perpendicular lines. I can write the equation of a line in slope-intercept form. I can write the equation of a line in general (or standard) form.

- ✓ I can graph a line. I can identify the slope and *y*-intercept of a line from its equation or graph.

2-4. Circles

- ✓ I can write the standard form of the equation of a circle.
- ✓ Given its properties, I can graph a circle and write its equation.
- ✓ I can complete the square to write the equation of a circle in standard form.

3-1. Functions

- ✓ I can determine whether a relation represents a function and find the value of a function.
- ✓ I can find and simplify the difference quotient of a function.
- ✓ I can find the domain of a function defined by an equation.
- ✓ I can combine functions using addition, subtraction, multiplication, and division.

3-2. Graphs of Functions

- ✓ I can identify the graph of a function. I can obtain information from or about the graph of a function.

4-1. Linear Functions and Linear Models

- ✓ I can graph a linear function. I can determine whether a linear function is increasing, decreasing or constant. I can determine the average rate of change of a linear function and use it to identify linear functions.
- ✓ I can build linear models from verbal descriptions and use the models to establish conclusions.

4-3. Quadratic Functions

- ✓ Given a quadratic equation, I can identify the vertex and the axis of symmetry on its graph. I can graph a quadratic function using its equation. I can graph a quadratic function using its vertex and one other point. I can find and identify *x*-intercepts on the graph of a quadratic function.
- ✓ I can use an equation or a graph to find the minimum or maximum value of a quadratic function.

4-5. Quadratic Inequalities

- ✓ I can solve inequalities involving quadratic functions.

5-1. Polynomial Functions and Polynomial Models

- ✓ I can identify polynomial functions and their degree. I can graph polynomial functions using transformations. I can analyze the graph of polynomial functions.
- ✓ I can identify the real zeros of polynomial functions and their multiplicity.

5-2. Properties of Rational Functions

- ✓ I can find the domain of a rational function.

- ✓ I can find the vertical asymptotes of a rational function. I can find the horizontal asymptotes of a rational function. I can find the oblique asymptotes of a rational function.

~~5-3. Graphs of Rational Functions~~

- ~~✓ I can analyze the graph of a rational function.~~
- ~~✓ I can solve applied problems involving rational functions.~~

5-4. Polynomial and Rational Inequalities

- ✓ I can solve polynomial inequalities of degree >2.
- ✓ I can solve rational inequalities.

6-1. Composite Functions

- ✓ I can combine functions using composition.
- ✓ I can find the domain of a composite function.

6-2. One-to-One Functions and Inverse Functions

- ✓ I can determine whether a function is one-to-one.
- ✓ I can obtain the graph of the inverse function from the graph of the function.
- ✓ I can determine the inverse of a function defined by a map or a set of ordered pairs. I can find the inverse of a function defined by an equation.

6-3. Exponential Functions

- ✓ I can evaluate exponential functions. I can define the number *e* and approximate it to nine decimal places.
- ✓ I can graph exponential functions.
- ✓ I can solve basic exponential equations.

6-4. Logarithmic Functions

- ✓ I can change an exponential equation to a logarithmic equation. I can change a logarithmic equation to an exponential equation.
- ✓ I can evaluate logarithmic expressions without using a calculator.
- ✓ I can determine the domain of a logarithmic function (requires 5-4).
- ✓ I can graph logarithmic functions.
- ✓ I can solve basic logarithmic equations.

8-1. Systems of Linear Equations

- ✓ I can solve systems of linear equations in two variables by substitution. I can solve systems of linear equations in two variables by elimination.
- ✓ I can identify inconsistent systems of equations in two variables. I can express the solution of a system of dependent equations containing two variables.