Prerequisite Skills: To ensure that a student will have the most successful experience in this class, it will be assumed that the student can (prior to enrolling in Math 2) perform with reasonable accuracy all of the following:

- Perform fundamental operations on polynomials
- Solve linear equations and inequalities involving one variable
- Solve equations and application problems involving rational expressions
- Perform fundamental operations on functions
- Perform operations on complex numbers
- Solve quadratic equations and graph them in the Cartesian plane
- Demonstrate the relationship between exponential and logarithmic functions
- Set up and solve systems of linear equations
- Recognize equations of conic sections and graph them using pertinent information derived from the equations
- Be able to use and apply important theorems from geometry (those involving similar & congruent triangles, parallel lines, polygons & their properties, relations of lines and circles, and right triangles)

Exit Skills: In order to pass this course and be prepared for the subsequent course (Math 7), students must be able to do all of the following:

- Determine whether a relation represents a function. If it is a function, determine its domain and range, determine whether it is odd or even or neither based on its formula or its graph, and determine whether it is one-to-one; and if it is, determine its inverse function and its domain and range.
- Analyze and graph a given function, including but not limited to piecewise-defined, polynomial, rational, exponential, logarithmic, trigonometric, and inverse trigonometric functions, without the aid of graphing devices. Determine intercepts, coordinates of holes, and equations of asymptotes. Determine intervals on which polynomial and rational functions are positive and negative.
- Use transformation techniques including vertical and horizontal shifts, compression, stretching, and reflection over the x- or y-axis to sketch the graph of a function.
- Use the language and standard mathematical notation of the algebra of functions.
- Determine algebraic combinations and compositions of functions and state their domains. Write a given function as a composition of two non-identity functions.

- Use techniques and facts including synthetic division, long division, the Fundamental Theorem of Algebra and the Rational Zeros Theorem to find all complex zeros of a polynomial function of degree three or higher, and write the function in a completely factored form.
- From memory, state and apply the definitions of the six trigonometric ratios of sides of right triangles; the definitions of the six trigonometric functions of real numbers using the unit circle; and the definitions, domains and ranges of the inverse sine, inverse cosine, and inverse tangent functions.
- Evaluate trigonometric functions at integer multiples of $\frac{\pi}{6}$ and $\frac{\pi}{4}$, including values outside of $[0, 2\pi]$, without the use of notes or calculators. Evaluate compositions of trigonometric functions and inverse trigonometric functions including ones for which cancellation equations do not apply.
- From memory, state and apply the fundamental reciprocal, quotient and Pythagorean trigonometric identities and the sum, difference, double-angle and half-angle identities for sine and cosine.
• Write algebraic and trigonometric relationships to solve application problems, including
solution of right and oblique triangles by the Law of Sines and Law of Cosines.
• Prove trigonometric identities including those which require the use of sum, difference, double-
angle and half-angle identities.
• Solve polynomial, rational, exponential, logarithmic, and trigonometric equations.
• Given a quadratic equation in variables x and y, with no xy-term, put it into a standard form in
order to classify its graph as one of the conic sections (circle, ellipse, parabola, hyperbola).
Determine the directrix, center, vertex points, focus points, major/transverse axis, and
minor/conjugate axis, if they exist, and sketch the graph of the conic section.
• Find terms of explicitly and recursively defined sequences. Find the $n^{th}$ term in a sequence
whose first several terms are given.
• Evaluate, manipulate and interpret summation notation.
• Prove statements using mathematical induction.
• Apply the binomial theorem to expand an integer power of a binomial and find a required term.
• Synthesize multiple skills and techniques in order to solve a complex, multi-step problem.