TOPICAL OUTLINE FOR PRE-CALCULUS

A. REVIEW OF ALGEBRA AND GEOMETRY

1. Simplifying Using the Order of Operations
2. Solving Complex Equations
3. Solving Linear Inequalities
4. Solving Rational Equalities
5. Solving Absolute Value Equations
6. Solving Absolute Value Inequalities
7. Expansion of Polynomials
8. Algebraic Long Division
9. Graphing Linear Equations
10. Determining Slope
11. Determining Linear Equations
12. Simplifying Radials
13. 30-60-90 and 45-45-90 Special Right Triangles
14. Conversions Between Radians and Degrees
15. Conversions and Simplifications Between Radicals and Rational Exponents
16. Operations on and Simplification of Imaginary Numbers
17. Solving Using the Quadratic Equation
18. Simplifying and Solving Using Factoring
19. Solving Radical Equations

B. CONIC SECTIONS

1. Introduction to Conic Sections
2. Equations of Circles
3. Graphing Circles
4. Equations of Parabolas
5. Graphing Parabolas
6. Equations of Ellipses
7. Graphing Ellipses
8. Equations of Hyperbolas
9. Graphing Hyperbolas
10. Solving the Intersection of Two Conics Graphically
11. Solving the Intersection of Two Conics Algebraically

C. ADVANCED ALGEBRA

1. Determining Functions with the Vertical Line Test
2. Domain and Range of Functions
3. Graphing Complex Functions
4. Determining Relative Maximums and Minimums
5. Determining Where Functions Increase and Decrease
6. Solving Equations Using Substitution
7. Advanced Completing the Square Applications
8. Solving Rational Inequalities
9. Translations
10. Symmetries
11. Odd and Even Functions
12. Solving Right Triangle Word Problems
13. Descarte's Rules of Signs and End Behavior
14. Vertical, Horizontal, and Oblique Asymptotes
15. Factoring and Solving Large Polynomials and Finding Zeros Using Synthetic Division
16. Partial Fraction Decomposition

D. EXPONENTIALS AND LOGARITHMS

1. Review of Basic Exponentials and Logarithms
2. Simplifying Rational Exponents
3. Solving Exponential Equations
4. Graphing Exponential and Logarithmic Equations
5. Simplifying Logarithmic Equations
6. Exponential and Logarithmic Application Problems

E. TRIGONOMETRY

1. Introduction to Trigonometry
2. Basic Sine, Cosine and Tangent Right Triangle Equations
3. Radians Versus Degrees
4. Conversions Between Decimal Angles and Degrees, Minutes, Seconds Angles
5. Cosecant, Secant, and Cotangent Right Triangle Equations
6. The Unit Circle
7. Producing Exact Trigonometric Answers for Special Angles
8. Inverse Trigonometric Functions
9. Arc Length and Angular and Linear Speed Application Problems
10. Right Triangle Trigonometric Application Problems
11. Calculating Periods, Phase Shifts, and Amplitudes
12. Graphing all Six Trigonometric Functions
13. Introduction to the Law of Sines
14. Introduction to the Law of Cosines
15. Calculating the Area of any Triangle Using Sines
16. Solving SAS, ASA, AAS, SSS, and SSA Triangles
17. Application Problems Involving the Law of Sines and Law of Cosines
18. Proving Trigonometric Identities
19. Solving Trigonometric Equations Involving Identities and Factoring
20. Using the Half/Double Angle Formulas to Calculate Exact Answers
21. Using the Sum/Difference Angle Formulas to Calculate Exact Answers

F. MATRICES

1. Introduction to Matrices
2. Overview of the Basic Rules and Operations Involving Matrices
3. Calculating Determinants on Matrices up to and Including 4x4 Matrices
4. Calculating Inverses on Matrices up to and Including 4x4 Matrices
5. Solving Systems of Equations Including 4x4 Systems
6. Solving Application Problems Using Matrices
7. Solving Systems Using Cramer's Rule

G. COMPLEX NUMBERS, POLAR GRAPHS, AND VECTORS

1. Introduction to the Complex Plane
2. Addition and Subtraction in the Complex Plane
3. Multiplication and Division in the Complex Plane
4. Absolute Value of Complex Numbers
5. Conversion Between Polar and Rectangular Forms
6. De Moivre's Theorem and Applications
7. Determining the Roots of Complex Numbers
8. Polar Graphs Including Cardioids, Roses, Spirals and Limacons
9. Introduction to Vectors
10. Basic Operations on Vectors
11. Calculating the Dot Product Between Two Vectors
12. Vector Application Problems

H. SEQUENCES AND SERIES

1. Introduction to Sequences and Series
2. Summation Notation
3. Calculating Finite and Infinite Sums
4. Arithmetic Sequences and Series
5. Application Problems Involving Arithmetic Sequences and Series
6. Geometric Sequences and Series
7. Application Problems Involving Geometric Sequences and Series
8. Harmonic Sequence and Series
9. Application Problems Involving Harmonic Sequences and Series
10. Quadratic Sequences and Series
11. Cubic Sequences and Series
12. Convergent and Divergent Sequences and Series