CTY MATHEMATICS SEQUENCE — MASTERY CHECKLIST

ANALYTIC GEOMETRY

Student’s Name: _________________________ Instructor’s Name: _________________________
Site: __________________ Session: ________________

1. Three-Dimensional Vectors
   - identify, add, and subtract three-dimensional position vectors
   - find the length of a vector
   - calculate the scalar product of two vectors
   - find the angle between two vectors
   - find the projection of one vector on another
   - find the equation of a plane and the measure of the dihedral between two planes
   - compute the cross product of two vectors
   - use the cross product to find a vector normal to two other vectors
   - find the direction angles and direction cosines of a vector
   - find points on the vector equation of a line and vice versa

2. Analytic Geometry of Conic Sections and Quadric Surfaces
   - plot second-degree equations in two variables
   - identify and sketch conic sections from their equations
   - use translation and dilation to transform second-order equations into one of the standard forms for conic sections
   - use parametric equations to plot ellipses, circles, and hyperbolas
   - solve and graph systems of quadratics
   - sketch various quadratic surfaces and calculate areas and volumes of inscribed figures
   - construct conics using the focus-directrix property
   - use the two foci property to draw ellipses and hyperbolas
   - write or analyze equations of conics based upon: foci, directrices, eccentricity, and the latus rectum
   - transform an equation for a conic which has been rotated through a given angle
   - eliminate xy-terms in the equations of a conic by rotating axes
   - use conic sections to generate and apply mathematical models

3. Polar Coordinates, Complex Numbers, and Moving Objects
   - graph equations stated in polar coordinates
   - find and graph polar equations of conics and lines
   - transform a polar equation to Cartesian coordinates and vice versa
   - find the intersection of two polar curves
   - perform basic operations with imaginary numbers
   - perform basic operations with complex numbers
   - transform complex numbers to polar form and perform basic operations
   - represent vectors as complex numbers and find sums
   - plot parametric equations as complex numbers and find sums
   - plot parametric equations and transform them into a single Cartesian equation

4. Sequences and Series
   - calculate terms and sums in arithmetic, geometric, and binomial series
   - represent sequences explicitly and recursively
   - find partial sums of series
   - find the number of terms in a series when given a partial sum
   - use sigma notation to write partial sums
   - use the binomial formula to expand an expression into a series

COMMENTS OR ADDITIONAL TOPICS COVERED:
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