

## Learning Standards and Targets for Algebra III

### 1. The student will solve and graph polynomial equations.

I (the student) will be able to:

- graph a function from a piece-wise definition.
- write a piece-wise definition of a function from a graph.
- identify the domain and range from graphs and equations.
- identify  $x$ - and  $y$ -intercepts from graphs and equations.
- recognize the general shape of a function from a given equation
- apply Descartes' Rule of Signs to determine the number of positive, negative and imaginary roots.
- apply the Rational Zero Theorem to determine the potential rational zeros.
- factor polynomials of degree 3 or higher.
- find the zeros of a polynomial .
- write an equation of a polynomial given the zeros.

### 2. The student will graph rational equations.

- give the domain and range from graphs and equations.
- identify  $x$ - and  $y$ - intercepts from graphs and equations.
- identify and graph vertical, horizontal and slant asymptotes of a rational function.
- identify the holes (breaks in continuity) of rational functions.
- graph a rational function

### 3. The student will solve systems of equations and inequalities.

I (the student) will be able to:

- evaluate a determinant by diagonals, minors or using a graphing calculator.
- solve  $3 \times 3$  linear systems using substitution, linear combinations, Cramer's Rule or a graphing calculator.
- solve larger linear systems using Cramer's Rule.
- apply the above to real-world situations.

#### 4. The student will analyze sequences and series.

I (the student) will be able to:

- find the next term from a given list of terms
- identify whether a sequence or series is arithmetic, geometric or neither.
- determine the common difference of an arithmetic sequence.
- determine the common ratio of a geometric sequence.
- find the explicit and/or recursive formula from given information.
- find the  $n$ th term of a sequence.
- find the sum of a given series.
- interpret sigma notation..
- apply the above to real-world situations.
- expand a binomial using Pascal's triangle.
- determine the  $n$ th term in a binomial expansion.

#### 5. The student will analyze equations and graphs of conic sections

I (the student) will be able to:

- convert a general form equation of a parabola, ellipse or hyperbola into standard form.
- graph parabolas, ellipses and hyperbolas from standard form.
- identify the vertex, axis of symmetry, focus, directrix, and latus rectum of equations representing horizontal and vertical parabolas.
- find minimum/maximum after determining the direction of opening.
- apply the above to real-world situations
- identify the center, vertices, foci, endpoints, and major and minor axes of equations representing horizontal and vertical ellipses.
- identify the center, vertices, foci, asymptotes, and transverse and conjugate axes of equations representing horizontal and vertical hyperbolas.
- write the standard form equation of a parabola, ellipse and hyperbola from given information.
- solve nonlinear systems algebraically and graphically.