



## Review Topics for Math 12 Competency Exam

1. Factoring with fractional exponents and binomial factors
2. Algebra with complex numbers
3. Solving quadratic equations and equations reducible to quadratics. Answers may include imaginary parts.
4. Functions
  - a. Function notation (e.g. given  $f(x)$  algebraically or graphically, determine  $f(2)$ ; determine  $[f(a+h)-f(a)]/h$ )
  - b. Determining the domain and range of functions
  - c. Linear functions and lines
  - d. Graphic piecewise defined functions – determining where they are continuous, increasing, discontinuous, etc.
  - e. Composite functions
  - f. Graphic quadratic functions – determining domain and range, axis of symmetry, vertex, maximum or minimum value, intercepts, etc.
  - g. Sketching polynomial functions, showing all intercepts, asymptotes (horizontal, vertical and/or oblique) and one point in each interval
5. Solving quadratic and rational inequalities
6. Finding all the roots of polynomials by finding all possible rational roots and using synthetic division and/or theorems about roots
7. Determining inverse functions and whether the functions are one-to-one
8. Exponential and logarithmic functions:
  - a. Graphing exponential and logarithmic functions
  - b. Solving exponential and logarithmic equations
  - c. Common and natural logarithms and their properties
  - d. Exponential growth or decay word problems
9. Trigonometric functions:
  - a. Unit circle
  - b. Sine, cosine, tangent, cotangent, cosecant, secant, and their inter-relationships
  - c. Transforming the sine or cosine functions and identifying the period, amplitude and phase shift
  - d. Proving trigonometric identities
  - e. Solving trigonometric equations, giving either all solutions or solutions in a particular domain
10. Conic sections
  - a. Distance and midpoint formulae
  - b. Definition, notation, graph, and standard form of circle, ellipse, hyperbola, parabola
11. Solving a system of equations graphically and/or algebraically
12. Sequence and series
  - a. Definitions and notation
  - b. Converting between summation notation and series

- c. Identifying sequences/series as arithmetic or geometric sequence/series
- d. Determining the “nth” term of an arithmetic or geometric sequence/series
- e. Finding the sum of an infinite geometric series, if it exists