Final Exam Topics

Math 112

Chapter 1:

- Parent functions
  - Lines
  - x^2
  - x^3
  - x^p
  - $\dfrac{1}{x}$
  - $\dfrac{1}{x^2}$
  - $\dfrac{1}{x^p}$
  - $\sqrt{x}$
  - $\sqrt[3]{x}$
  - $x^{1/p}$
  - e^x
  - $\ln x$

- Even and odd functions
  - Definition
  - Symmetry interpretation

- Transformations
  - Vertical shifts

  - Vertical stretches
  - Vertical reflections
  - Horizontal shifts
  - Horizontal stretches
  - Horizontal reflections
  - The order to apply them when there's more than one

- Periodic Functions
  - Formal definition
  - Period
  - Finding roots of periodic functions
  - Graphing them
  - Midline and amplitude

Chapter 2:

- Basic geometry
  - Definition of acute, right, and obtuse
  - Finding angles in diagrams (using complementary and supplementary angles)
  - Reference angles
  - The sum of the angles in a triangle
  - The area of a triangle
  - The Pythagorean theorem
  - Definitions of opposite, adjacent, and hypotenuse
  - The unit circle

- The three basic trig functions
  - Definition of sine, cosine, and tangent as quantities of points on the unit circle
  - Special angles

  - $\sin^2(\theta) + \cos^2(\theta) = 1$
  - Finding trig functions with reference angles
  - Trig functions as ratios of sides in right triangles
  - Graphs
  - Transformations of sine and cosine as coordinates of points on a transformed circle
  - The arc functions
  - Arc functions of unit circle quantities to get angles
  - Arc functions of ratios of sides in right triangles to get angles

Chapter 3:

- Radians
  - Definition
  - Arc length
  - Trig functions of angles in radians

- Non-right triangles
  - The Law of Cosines
  - The Law of Sines

- Trig equations
  - Finding one solution with an arc function
  - Finding a second solution with a line in the unit circle
  - Find all solutions by adding $2\pi n$ to the first two solutions

- Sinusoidal functions
  - Finding midline, amplitude, and period
  - Finding horizontal shift via a trig equation

  - Finding roots via another trig equation

- The secant, cosecant, and cotangent functions (definition, but not graph)

- When to use the sum, difference, double-angle, and half-angle identities (but not exactly what they all are)

Chapter 4:

- Vectors as quantities that measure a change in location

- Vector arithmetic

- Magnitude and direction

- Unit vectors

- The unit vector decomposition of a vector

- Changing between magnitude-direction and unit vector descriptions of a vector

- The dot product
  - Formal definition (with unit vectors)
  - Use with magnitude-direction description
  - Finding angle between vectors
  - Orthogonality