Math 143
Final Exam Review Sheet

Part 0: Sections 1.1, 3.1, 3.2, 3.4, 3.5

Note: These sections are review material and mainly be tested indirectly on the final.

Key Topics:
• The Cartesian Plane, plotting points
• The Pythagorean Theorem and the distance formula
• Sketching graphs by plotting points
• Symmetry of graphs (x-axis, y-axis, origin)
• Circles (general equation, finding the center and radius, graphing)
• The definition of a function and the vertical line test
• The Domain and Range of a function (finding these both algebraically and graphically)
• Even and Odd functions (their symmetry properties, and testing to see is a given function is even, odd, or neither)
• Understanding and interpreting shifts of functions (the 6 basic shifts and their impact on the graph of a function)

Part 1: Chapter 6 - Sections 6.1, 6.2, 6.3, 6.4, 6.5, 6.6, and 6.7

Key Topics:
• The definition of an angle, finding coterminal angles, the definition of complimentary and supplimentary angles
• Converting between degree and radian angle measure, know the location of key angles (multiples of 30° and 45°) in both degree and radian form
• Using radians to find the length of a circular arc
• Know the definition of the 6 basic trig functions both for acute angles and general angles.
• Memorize the key values of trig functions for **all** multiples of 30° and 45°
• Know and be able to sketch the basic graphs of the 6 trig functions, and know the definition of a periodic function
• Computing values of trigonometric functions in any quadrant using reference angles and appropriate signs.
• Understanding the features of sine and cosine graphs (amplitude, period, phase shift, midline, max, and min)
• Graphing sin and cos graphs with multiple shifts, or, working backwards to find the equation for a sin or cos function from its graph
• Finding a sine or cosine graph to fit data from a phsysical phenomenon
• Understanding the features of tangent, cotangent, secant, and cosecant graphs (asymptotes, zeroes, period, phase shift, midline)
• Graphing tangent, cotangent, secant, and cosecant graphs with multiple shifts
• Solving right triangles, and application problems involving right triangles.

Part 2: Chapter 7 - Sections 7.1, 7.2, 7.3, 7.4, *5.1*, 7.6

Key Topics:
• Memorize Key Identities (Pythagorean, Fundamental, Negative, and Reciprocal identities)
• Be able to verify that a given identity holds using algebra and other known identities
• Be able to use counterexamples to show that a given trig equation is not an identity
• Be able to solve elementary trig equations ($\sin\theta = a$, $\cos\theta = a$, $\tan\theta = a$).
• Be able to solve equations involving shifts and multiples of angles.
• Be able to use factoring to solve trigonometric equations
• Be able to find all possible solutions to a trig equation, or solutions on a given interval.
• Memorize key formulas (addition, subtraction, and double angle formulas for sin and cos)
• Use addition, subtraction, and double angle formulas to compute exact values of sin and cos for combinations of key angles and to find the quadrant of a sum or difference of two angles using information about the sin and cos of the original angles.
• Use these formulas to solve equations and verify identities.
• Know the definition of a one to one function, and the definition of the inverse of a one to one function.
• Be able to determine whether or not a given function is one to one, and be able to find the equation for the inverse of a given function.
• Know the 7 key properties of inverse functions (see text page 550)
• Know the domain and range of $y = sin^{-1}x$, $y = cos^{-1}x$, and $y = tan^{-1}x$
• Be able to find exact values of expressions involving inverse trig functions, either using memorized key values or by building triangles and applying identities.
• Be able to put expressions involving inverse trig functions into algebraic form by solving the related right triangle.
• Be able to find the domain and range and sketch the graphs of equations involving inverse trig functions.
• Be able to solve equations that are of quadratic form using inverse trig functions.

Part 3: Chapter 8 - Sections 8.1, 8.2, 2.4, 8.5, 8.6, Polar Coordinates

Key Topics:
• Memorize the Law of Sines, and be able to solve non-right triangles using the Law of Sines, including cases where there are two possible triangles.
• Memorize all 3 forms of the Law of Cosines and be able to use the Law of Cosines to solve application problems.
• Memorize and be able to apply the formulas for finding the area of triangles.
• Know the definiton of i, and the standard form for a complex number
• Be able to add, subtract, multiply complex numbers
• Be able to simplify powers of i
• Be able to solve linear and quadratic equations involving complex numbers
• Know how to find the absolute value (modulus) of a comlex number.
• Understand the geometric representation of a complex number $z = a + bi$
• Understand the polar form of a complex number $z = rcis(\theta)$
• Be able to convert complex numbers from rectangular to polar (trigonometric form) and back
• Be able to multiply and divide complex numbers in polar form, and understand the geometric interpretation of these operations
• Be able to apply De Moivre's Theorem to compute powers of complex numbers in both polar and rectangular form
• Be able to apply the Theorem on n^{th} roots to find n^{th} roots of complex numbers.
• Be able to represent the nth roots of a complex number graphically
• Know the definitions and formulas for polar coordinates.
• Be able to translate both points and equations back and forth between polar and recangular coordinates.
• Be able to graph polar points and polar functions