MATH 141: OUTLINE FOR THE FINAL (SPRING 2006)

PART 1: MEMORIZE (NO NOTES OR CALCULATORS!)

Formulas for volumes of spheres and right circular cylinders and cones
(Section 1.1, Notes 1.03)

Finding zeros of a function, possibly using the Quadratic Formula
x- and y-intercepts of graphs of \( y = f(x) \)
(Section 1.4, Notes 1.31-1.35; and others)

Graphs, domains, and ranges of the \( e^x \) and \( \ln x \) functions
(Section 3.2, Notes 3.16)

Log properties
Expanding and condensing log expressions
Change of base formula
(Section 3.3)

Finding trig values
THE Table
Extending from Quadrant I to other Quadrants; ASTC and signs
Quadrantal angles and the Unit Circle
Reference angles (brothers) and Coterminal angles (twins)
(Sections 4.2-4.4)

Graphs, domains, and ranges of trig and inverse trig functions
(Sections 4.5-4.7)

Trig Identities:
Reciprocal, Quotient, Pythagorean, Cofunction, Even/Odd (Negative Angle),
Sum and Difference, Double-Angle, Power-Reducing (PRIs), Half-Angle,
NOT Product-to-Sum or Sum-to-Product
(Sections 5.1 and Handout on 5.4 and 5.5)

Proving using mathematical induction that: \( 1 + 2 + 3 + \ldots + n = \frac{n(n+1)}{2} \) \( (\forall n \in \mathbb{Z}^+) \)
(Section 9.4)

Binomial Theorem and Pascal’s Triangle
(Section 9.5)

Basic equations of hyperbolas
(Notes on Chapter 10)
PART 2: TWO SHEETS OF NOTES, SCIENTIFIC CALCULATOR OK

Converting among fractional, radical, exponential forms
(Section A.2, Notes P.12)

Simplifying algebraic expressions, weird factoring, compound fractions
(Sections A.4 and A.7, Notes P.18 to P.22)

Standard form of the equation of a circle
(Section 1.1)

Slope and equations of lines
(Section 1.2)

Domain of algebraic functions, possibly in interval form
Piecewise-defined functions
Difference quotients
(Section 1.3)

Translations and Reflections
(Section 1.6, Notes 1.59 to 1.61)

Compositions
(Section 1.7, Part B)

Polynomial Functions: Finding Zeros (Roots) and Factoring
   Rational Zero Test
   Synthetic Division
   Factoring
   Quadratic Formula
(Section 2.3, Parts B and D; Section 2.5, Part B)

Rational Functions:
   Vertical asymptotes
   Horizontal asymptotes
   Holes (i.e., removable discontinuities)
(Section 2.6)

PFD (Partial Fraction Decomposition) Forms
(Section 2.7)

CONTINUED ON THE BACK!
Change of base formula  
(Section 3.3)

Frame (PCAPI) Method for one cycle of a general sin, cos, or tan graph  
(Sections 4.5 and 4.6)

Rewriting expressions such as \( \cot \left( \cos^{-1} \frac{x}{3} \right) \) as algebraic expressions

Using SOH-CAH-TOA and the Pythagorean Theorem  
(Section 4.7, Notes 4.88-4.89; Sections 4.2-4.4)

Solving trig equations  
(Section 5.3)

Vectors  
(Section 6.3)

Sequences
Terms
Sign alternators
Even and Odd integers
Recursively defined sequences

Factorials and simplifications
Summation (sigma) notation
Arithmetic and geometric sequences
Convergence and sums of infinite geometric series
Expressing repeating decimals as nice fractions using geometric series  
(Chapter 9)

Ellipses
Standard form
Completing the Square (CTS)
“\(x\)-long” vs. “\(y\)-long”
Center, Foci, Vertices, Eccentricity
Graphing  
(Section 10.3)