

# **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:  $1 + 2 + 3 + \dots + n = \frac{n(n+1)}{2} \quad (\forall n \in \mathbf{Z}^+)$   
(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)