

PENN STATE UNIVERSITY  
MATH 40: ALGEBRA, TRIGONOMETRY, AND ANALYTIC GEOMETRY

Text: Precalculus Functions and Graphs, A Graphing Approach, 2001

Author: Larson/Hostetler/Edwards

Publisher: Houghton Mifflin, ISBN 0-618-05290-9

Course Outline

**Chapter P PREREQUISITES**

- P.1 Graphical Representation of Data \*\***
- P.2 Graphs of Equation**
- P.3 Lines in the Plane**
- P.4 Solving Equations Algebraically and Graphically**
- P.5 Solving Inequalities Algebraically and Graphically**

**Chapter 1: FUNCTIONS AND THEIR GRAPHS**

- 1.1 Functions**
- 1.2 Graphs of Functions**
- 1.3 Shifting, Reflecting, and Stretching Graphs**
- 1.4 Combinations of Functions**
- 1.5 Inverse Functions**

**Chapter 2: POLYNOMIALS AND RATIONAL FUNCTIONS**

- 2.1 Quadratic Functions (Also Solving Quadratic Equations, page 45)**
- 2.2 Polynomial Functions of Higher Degree**
- 2.3 Real Zeros of Polynomial Functions**
- 2.4 Complex Numbers**
- 2.5 The Fundamental Theorem of Algebra**
- 2.6 Rational Functions and Asymptotes**
- 2.7 Graphs of Rational Functions**

**Chapter 3: EXPONENTIAL AND LOGARITHMIC FUNCTIONS**

- 3.1 Exponential Functions and Their Graphs**
- 3.2 Logarithmic Functions and Their Graphs**
- 3.3 Properties of Logarithms**
- 3.4 Solving Exponential and Logarithmic Equations**
- 3.5 Exponential and Logarithmic Models**

**Chapter 4: TRIGONOMETRIC FUNCTIONS**

- 4.1 Radian and Degree Measure**
- 4.2 Trigonometric Functions: The Unit Circle**
- 4.3 Right Triangle Trigonometry**

- 4.4 Trigonometric Functions of Any Angle
- 4.5 Graphs of Sine and Cosine Functions
- 4.6 Graphs of Other Trigonometric Functions
- 4.7 Inverse Trigonometric Functions
- 4.8 Applications and Models

**Chapter 5: ANALYTIC TRIGONOMETRY**

- 5.1 Using Fundamental Identities
- 5.2 Verifying Trigonometric Identities
- 5.3 Solving Trigonometric Equations
- 5.4 Sum and Difference Formulas
- 5.5 Multiple-Angle Formulas

**Chapter 6: ADDITIONAL TOPICS IN TRIGONOMETRY**

- 6.1 Law of Sines
- 6.2 Law of Cosines
- 6.3 Vectors in the Plane \*\*
- 6.4 Vectors and Dot Products \*\*
- 6.5 DeMoivre's Theorem \*\*

**Chapter 7: SYSTEMS OF EQUATIONS AND INEQUALITIES**

- 7.1 Solving Systems of Equations
- 7.2 Systems of Linear Equations in Two Variables
- 7.3 Multivariable Linear Systems \*\*  
(Partial Fractions)
- 7.4 Systems of Inequalities \*\*
- 7.5 Linear Programming \*\*

**Chapter 10: TOPICS IN ANALYTIC GEOMETRY**

- 10.1 Introduction to Conics: Parabolas
- 10.2 Ellipses
- 10.3 Hyperbolas
- 10.6 Polar Coordinates

NOTES:

1. Calculators that perform symbolic manipulations (TI-89, TI-92, etc.) are not permitted for exams and/or quizzes.
2. Chapter P should be a review; so go over quickly.
3. Items in without **\*\* MUST** be covered; others are optional.
4. Partial Fraction are now in Section 7.3 and must be covered.
5. **The Final Exam must consist of questions that cover the following topics.**

Solving inequalities

Function evaluation (difference quotients)

Finding zeros of a function - polynomial, rational, radical, exponential, logarithmic, and trigonometric

Graphing functions, including finding domain and range (all functions, as above)

Using logarithmic properties

Solving equations, especially exponential and trigonometric

Evaluation of trigonometric functions of any angle

Inverse trigonometric functions

Completing the square

Word problems(quadratic models, exponential and logarithmic models, obtuse triangles, etc.)