

Mathematics 5: Pre-Calculus

Text: College Algebra and Trigonometry, Fourth Edition, by M. Dugopolski

Publisher: Addison Wesley

Prerequisite: A sufficiently high score on the placement examination, as determined by the Mathematics Department. A study of inequalities, absolute value, functions, graphing, logarithms, trigonometry, vector analysis, roots of polynomials, conics, counting and other elementary concepts of mathematics.

Even though all sections of chapters P through 2 in the book will not be covered in class, the student is expected to enter the class with a knowledge of this material. A very brief review of some of the topics in these sections will be covered as noted below.

Ch P Number groups, conjugates and division of complex numbers, long division of polynomials, compound fractions

Ch 1 Solving for a specified variable, solving word problems, quadratic equations, compound and absolute value inequalities

Functions and Graphs (a brief overview)

- 2.1 Functions (function notation and the Difference Quotient)
- 2.2 Graphs of Relations and Functions (increasing and decreasing notation)
- 2.3 Families of Functions, Transformations, and Symmetry (most assumed known)
- 2.4 Operations with Functions
- 2.5 Inverse Functions
- 2.6 Constructing Functions with Variation

Polynomial and Rational Functions

- 3.1 Quadratic Functions and Inequalities
- 3.2 Zeros of Polynomial Functions
- 3.3 The Theory of Equations
- 3.4 Miscellaneous Equations
- 3.5 Graphs of Polynomial Functions
- 3.6 Rational Functions and Inequalities

Exponential and Logarithmic Functions

- 4.1 Exponential Functions and Their Applications
- 4.2 Logarithmic Functions and Their Applications
- 4.3 Rules of Logarithms
- 4.4 More Equations and Applications

The Trigonometric Functions

- 5.1 Angles and Their Measurements
- 5.2 The Sine and Cosine Functions
- 5.3 The Graphs of the Sine and Cosine Functions
- 5.4 The Other Trigonometric Functions and Their Graphs
- 5.5 The Inverse Trigonometric Functions
- 5.6 Right Triangle Trigonometry

Trigonometric Identities and Conditional Equations

- 6.1 Basic Identities
- 6.2 Verifying Identities
- 6.3 Sum and Difference Identities
- 6.4 Double-Angle and Half-Angle Identities
- 6.6 Conditional Trigonometric Equations

Applications of Trigonometry

- 7.1 The Law of Sines, a brief mention
- 7.2 The Law of Cosines, a brief mention
- 7.3 Vectors
- 7.6 Polar Equations
- 7.7 Parametric Equations

Systems of Equations and Inequalities

- 8.1 Systems of Linear Equations in Two Variables
- 8.2 Systems of Linear Equations in Three Variables
- 8.3 Nonlinear Systems of Equations – a brief mention
- 8.4 Partial Fractions

The Conic Sections

- 10.1 The Parabola
- 10.2 The Ellipse and the Circle
- 10.3 The Hyperbola

Sequences, Series, and Probability

- 11.1 Arithmetic Sequences
- 11.2 Arithmetic Series
- 11.3 Geometric Sequences
- 11.4 Counting and Permutations
- 11.5 Combinations and the Binomial Theorem
- 11.6 Probability
- 11.7 Mathematical Induction