
NMH SUMMER SESSION

2010
College Prep Program
ALGEBRA II

This course covered the complete curriculum of a typical full-year course. Assessment was accomplished via quizzes and chapter tests, a midterm exam, and a final exam. Homework was collected every day, and the students were expected to spend approximately three hours on homework each night.

There was significant emphasis throughout the course on applying second-year algebraic techniques to problem-solving and modeling applications. Additionally, extensive use and a thorough understanding of the graphing calculator as an added tool to algebraic manipulation were expected of all students throughout the session. The course included a review of important topics of Algebra I and covered rational number exponents; functions and their graphs; quadratic functions and complex numbers; solution of linear and quadratic equations and systems of equations; properties and graphs of polynomial and exponential functions; complete solution of polynomial equations (rational, irrational, complex roots); and inequalities. The course was intended for students wishing to prepare for the study of precalculus and trigonometry.

List of topics taught:

Graphing Techniques

Transformations (shifts, stretches, reflections)
 $f(x) = x$, $f(x) = |x|$, $f(x) = x^2$, $f(x) = x^3$, $f(x) = 1/x$,
 $f(x) = 1/x^2$, $f(x) = -x$, $f(x) = e^x$, $f(x) = \ln(x)$,
 $y = f(x)$
domain and range

Absolute value

equations and inequalities: graphical and algebraic solutions
decomposition into an expression w/o absolute value signs

Functions

formal definition
notation and vocabulary
domain, range, extrema
composition, written as $f(g(x))$
inverses
modeling

Linear Functions

graphing: $y = mx + b$, point slope, 2 intercept, by grapher
algebraic solutions
modeling
linear regression by graphing calculator
solutions of systems of linear functions:
substitution, linear combination, graphing

Quadratic Functions

completing the square
graphs by hand and grapher
solving by quadratic formula, factoring,
graphing
modeling
quadratic regression

Complex Numbers

definition of "i"
operations on complex numbers

Exponential Functions

properties of exponents
rational exponents
graphs by hand and grapher
domain and range
inverse of a function
modeling

Factoring

common monomial factor
 ax^2+bx+c ,
difference of 2 squares, sum and difference of 2
cubes
grouping
quadratic form

Rational Functions

operations on rational expressions
graphs by grapher (correct window)
domain and range, x- and y-intercepts, vertical
and horizontal asymptotes
solving equations

Radical Expressions

operations
solving equations graphically and algebraically
extraneous solutions
domain and range
modeling using direct & inverse variation

Polynomial Functions

definition and operations, including factoring
graphs by grapher: extreme values
use of calculator to find rational roots, division
to find remaining complex or irrational roots
modeling, and cubic and quartic regression

The class met for three hours six mornings per week plus 1.5 hours four afternoons per week, for the five-week session.

TEXT: *Intermediate Algebra*, Margaret Lial, et al., Addison Wesley

Master Teacher: Michael Peller
Country Day School, Guanacaste

Teaching Intern: Jamie Tiscia
Boston College