
NMH SUMMER SESSION

2010
College Prep Program
PRECALCULUS

TEXT: *Precalculus with Limits* by Larson and Hostetler (Houghton Mifflin)

The course met for three hours six mornings per week, plus 90 minutes four afternoons per week, for the five-week session. The major emphasis was on developing a fundamental understanding of the elementary functions: polynomial and rational, exponential and logarithmic, and trigonometric and inverse trigonometric. Students learned how to graph these functions, what their major properties are, how to solve equations using them, and how to model real-life problems using them. The Texas Instruments TI-89 graphing calculator was used to supplement and enrich instruction and homework assignments. The textbook is written with the expectation that every student will have a graphing calculator. Some of the ways that the calculator was used included making a sketch of a function, finding its roots, intercepts, extrema, and solving equations. Students also solved many word problems based on practical applications.

The following material was covered:

Graphing Techniques

Transformations (shifts, stretches, reflections)
 $f(x) = x$, $f(x) = |x|$, $f(x) = x^2$, $f(x) = x^3$, $f(x) = 1/x$, $f(x) = x^{.5}$,
 $f(x) = e^x$, $f(x) = \ln(x)$, $f(x) = \sin(x)$, $f(x) = \cos(x)$
transformations (shifts, stretches, reflections),
 $y = a * f[b(x+c)] + d$
finding the equation from a graph
domain and range

Functions

Properties:
Domain and Range, Continuity,
Increasing and Decreasing,
Local and Absolute Extrema, Symmetry, Asymptotes,
End Behavior
Building Functions:
Composition, Inverse

Modeling with Functions:
Scatter Plots, Regression

Linear and Quadratic Functions

Power Functions and Variation
Higher Degree Polynomial Functions
Finding Zeros, Complex Numbers

Rational Functions

Graphs – limits and asymptotes
Inequalities

Exponential and Logarithmic Functions

Logistic Functions:
Characteristics and Graphs
Growth and Decay Problems

Trigonometry

Angles: Degrees and Radians
Trigonometric Functions:
Sine, Cosine, Tangent, Cotangent, Secant, Cosecant

Sine, Cosine, Tangent, and Cotangent Graphs:
Amplitude, Period, Phase Shift, Vertical Shift
Sinusoid Problems

Secant, Cosecant Graphs

Inverses of the Trigonometric Functions

Applications of the Trigonometric Functions

Analytic Trigonometry

Identities: Fundamental, Sum and Difference,
Multiple Angle
Law of Sines and Cosines

Sequences and Series

Arithmetic and finite geometric, sigma notation