

PRECALCULUS WITH LIMITS

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SYLLABUS

The text for this study will be **Precalculus with Limits: A Graphing Approach**, 5th edition, by Larson, Hostetler, and Edwards. This is available from Amazon. The essential flavor of this study comes in two parts:

- Learn about the common elementary functions and become familiar with their manipulation
- Learn about sequences, series, and limits

To that end, we will be going through a large portion of the text, and a large amount of time will be spent doing exercises aimed at building confidence with manipulating functions. At the end of this course, one should be able to graph linear, polynomial, trigonometric, exponential, and logarithmic equations; identify equations for given graphs; invert, compose, multiply, divide, and otherwise manipulate functions; use the unit circle to determine values of trig functions; state and use trigonometric identities; compute and manipulate basic limits of sequences and functions.

For this course, having graph paper is essential and a graphing calculator at or above the level of a TI-83 is recommended.

Date: Summer 2012.

APPROXIMATE SCHEDULE

Each week, there will be a quiz on Wednesday and a test on Friday. The quizzes will cover material covered up to that point in the week, but all tests will be cumulative (it's a cumulative subject). Examination material will not include that day's work, except when that day is reserved for review.

Time permitting, more proof material will be worked into expected class work. There is a large disparity between the proofs typically expected from an algebra or geometry student and the proofs expected from a calculus or vector spaces student.

This study is organized to take place in 25 lessons. Each lesson is designed to be between 2 and 3 hours long (after the first 2 lessons, the daily length will be easier to solidify).

Arranged per Lesson Number

- (1) Appendix B
 - (a) Review graphs, polynomials, and graphing
 - (b) Review solving equations, systems of equations, and using graphs to solve equations
- (2) 1.1 - 1.4: Functions and their graphs
- (3) 1.5 - 1.6: Combinations of functions, and their inverses

Before learning new material, there will be a

 - (a) 30 minute problem-solving session
 - (b) 30 minute quiz on sections 1.1 - 1.6 of the book
- (4) 2.1- 2.5: Higher degree polynomials and complex numbers
- (5) 2.6 - 2.8: Rational functions

Before learning new material, there will be a

 - (a) 30 minute problem-solving session
 - (b) 30 minute test (cumulative)
- (6) 3.1 - 3.3: Exponential functions, logarithms, and their properties
- (7) 3.4 - 3.5: Using exponential and logarithmic models
- (8) 3.6 and (not in book) an introduction to mathematical proofs

Before learning new material, there will be a

 - (a) 30 minute problem-solving session
 - (b) 30 minute quiz on sections 3.1-3.6 from book
- (9) 4.1-4.3: Introducing trigonometric functions
- (10) 4.3-4.6: Graphing trigonometric functions

Before learning new material, there will be a

 - (a) 30 minute problem-solving session
 - (b) 30 minute test (cumulative)
- (11) 4.7-4.8: Inverse trigonometric functions and review
- (12) 5.1-5.3: Trigonometric Identities
- (13) 5.4-5.5: Applying Analytic Trigonometry

Before learning new material, there will be a

 - (a) 30 minute problem-solving session
 - (b) 30 minute quiz on trig identities and trig inverses

- (14) 6.1-6.2: The laws of sines and cosines
- (15) Review of manipulating functions
 - After today's lesson, there will be a**
 - (a) 30 minute problem-solving session
 - (b) 30 minute test (cumulative)
- (16) 9.1-9.3: Intro to analytic geometry and conic sections
- (17) 6.3-6.4, 9.5 - 9.6: (deviation from book) Vectors, parametric equations, and polar coordinates
- (18) 9.7-9.8: Polar forms of conic equations
 - Before learning new material, there will be a
 - (a) 30 minute problem-solving session
 - (b) 30 minute quiz on vectors and conic sections
- (19) 10.1-10.4: 3 dimensional analytic geometry and (not in book) dot products
- (20) 6.5 and further introduction to mathematical proof
 - Before learning new material, there will be a
 - (a) 30 minute problem-solving session
 - (b) 30 minute test (cumulative)
- (21) 8.1-8.3: Sequences and series
- (22) 11.1-11.3: Introduction to limits
- (23) (Material not in book) Re-examining continuity and limits of continuous functions
 - Before learning new material, there will be a
 - (a) 30 minute problem-solving session
 - (b) 30 minute quiz on sequences, series, limits, and continuity
- (24) 11.4-11.5: Limits at infinity, and an introduction to calculus
- (25) Review of the whole course
 - After reviewing day's material, there will be a**
 - (a) 30 minute problem-solving session
 - (b) 1 hour final examination (everything to date)

HOMEWORK AND SUPPLEMENTARY MATERIALS

A variety of problems will be assigned each day, but in general will not be graded. As this is one-on-one, understanding of the assigned material can be quickly assessed by short question and answer sessions during each lesson. It is possible that I will want to provide supplementary material in addition to the text. In that case, my preferred medium is my math blog: mixedmath.wordpress.com.