Marion Graziano

**Textbook:** *Calculus I with Precalculus, a One Year Course* by Larson, etc. 2nd Edition

**Calculator:** The Ti-84+ graphing calculator is required for the course. If a student has a TI-83+, they do not need to buy a Ti-84+.

**Course Description:** This course is a continuation of MAT 188. It is a four-credit course. This course completes the coverage of Calculus I, MAT 190. MAT 189 covers limits, differentiation, integration curve sketching and applications for rational and radical functions. Also covered is an introduction to logarithms, exponential functions, and conic sections. The course concludes with a summary of Calculus I. A graphing calculator is required for class, homework, and testing. Classroom instruction and programs will be presented using a TI-84+.

**Prerequisite:** MAT 188 with a C or better.

**Office:** Parkhouse Hall 143  
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**Office hours:** Monday  
Wednesday  
Friday

**Grading:**  

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<thead>
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**Criteria for Evaluation**  
Tests will be worth 100 points each, quizzes and worksheets will be worth 10 points each, and the final will be worth 150 points.

**Make-up Exam Policy:** A make-up exam will NOT be given under any circumstances. You MUST contact me right away. Do not wait until the next class to talk to me.

**Withdrawal Policy:** You may withdraw at any time during the semester. You may NOT withdraw during final exam week.
Students with disabilities may be eligible for accommodations in this course. Please contact the Director of Services for Students with Disabilities in College Hall 131, at 215-641-6576/6577 for more information.

School Closing Number: 320
MAT 189 OUTLINE

Limits of Rational Functions

Homework:
Section 3.2 pg. 216 12, 15
Section 3.4 pg. 235 33, 35, 36, 37, 61, 63, 65
Section 3.5 pg. 243 3, 5, 7, 11, 25, 27, 33, 37, 50, 56, 63
Section 5.5 pg. 353 7, 13, 15, 19, 31, 41

Examples:
Section 3.2 Examples 4 and 5
Section 3.4 Example 1b
Section 3.5 The whole section
Section 5.5 Definition of Horizontal Asymptote, Examples 3 and 5

Basic Rational Functions and Solving Rational Equations

Homework:
Section 2.6 pg. 193 7, 11, 13, 21, 23, 25, 39, 45, 51, 55, 75, 88, 89, 90
Section P4 pg. 44 41, 42
Section P1 pg. 12 171 to 178
  pg. 10 in notes

Examples:
Section 2.6 Examples 2, 3, 5, and 7
Section P1 Examples 2 and 3

Derivatives of Rational Functions

Homework:
Section 4.1 pg. 260 21
Section 4.2 pg. 270 7, 21, 33, 51, 79, 80, 93
Section 4.3 pg. 280 11, 22, 45, 56
Section 4.4 pg. 290 31, 33, 46

Examples:
Section 4.1 Example 5
Section 4.2 Examples 2c and 6
Section 4.3 Example 3 and bottom two problems on page 280
Section 4.4 Examples 6 and 9

Graphs of Rational Functions

Homework:
Section 5.6 pg. 361 7, 11, 13, 14, 15, 17, 39 (use nderiv), 51, 53, 55, 63

Examples:
Section 5.6 Examples 1 and 2
Antiderivatives, Reimann Sums, Fundamental Theory of Calculus

**Homework:**
Section 6.1 pg. 394 25, 26, 28, 66
Section 6.3 pg. 417 12, 18, 56
Section 6.4 pg. 429 13, 14, 30, 38, 42, 67, 72, 75
Handout pg. 28 in notes

**Examples:**
Section 6.1 Examples 3a and 6

Integration by Substitution

**Homework:**
Section 6.5 pg. 442 17, 18, 19, 20
Handout pg. 32 in notes

**Examples:**
Section 6.5 Example 7d

TEST 1

Basic Radical Functions

**Homework:**
Section P1 pg. 12 153, 157, 160, 163, 165, 169
Section P4 pg. 44 18, 31, 32, 43, 44, 45 (Find the domain and range)

**Examples:**
Section P1 Examples 10 and 11

Limits of Radical Functions

**Homework:**
Section 3.2 pg. 215 3, 33, 47
Section 3.3 pg. 224 2, 17, 25, 43, 45
Section 3.4 pg. 234 9, 10, 27, 62, 64
Section 3.5 pg. 243 58
Section 5.5 pg. 353 10, 17, 27, 33, 37, 61

**Examples:**
Section 3.2 Example 1
Section 3.3 Examples 4a and 7, Theorem 3.4
Section 3.4 Examples 2 and 4
Section 5.5 Example 7
Derivatives of Radical Functions

**Homework:**
Section 4.1  pg. 259  23, 50, 53, 71, 72  
Section 4.2  pg. 270  9, 10, 25, 41, 42, 43, 44  
Section 4.3  pg. 280  3, 9, 23, 29, 30, 55  
Section 4.4  pg. 289  5, 11, 15, 23, 27, 29, 30, 53  
Handout  pg. 50 in notes

**Examples:**
Section 4.1  Examples 4 and 7  
Section 4.2  Examples 2b and 5c  
Section 4.4  Examples 2b, 5, 7, and 8

Graphs of Radical Functions

**Homework:**
Section 5.3  pg. 335  9, 23, 25, 58  
Section 5.4  pg. 343  17, 20, 32  
Section 5.6  pg. 361  19, 21, 23, 24

**Examples:**
Section 5.3  Example 3  
Section 5.6  Examples 3 and 4

Integration of Radical Functions

**Homework:**
Section 6.1  pg. 394  9, 11, 23, 27, 54  
Section 6.2  pg. 407  27  
Section 6.3  pg. 417  11  
Section 6.4  pg. 429  15, 17, 19, 21, 34, 40, 43, 62, 65, 70, 72, 76  
Section 6.5  pg. 442  3, 7, 12, 15, 21, 27, 49, 51, 70, 72

**Examples:**
Section 6.1  Examples 4 and 5  
Section 6.3  Example 1  
Section 6.4  Examples 1b and 7  
Section 6.5  Examples 2, 4, 5, 6, 7c, and 9

TEST 2

Exponential Functions and Their Graphs

**Homework:**
Section 7.1  pg. 464  1, 5, 11, 12, 14, 37, 41, 43, 51, 55, 67, 68, 69, 76, 79, 81, 89
Logarithmic Functions and Their Graphs

**Homework:**
- Section 1.5 pg. 114 11, 37
- Section 7.2 pg. 475 1, 7, 9, 15, 33, 37, 39, 41, 57, 59, 61, 63, 65, 69, 72, 75, 76, 80, 92

Properties of Logarithms and Exponential and Logarithmic Equations

**Homework:**
- Section 7.3 pg. 483 1, 5, 9, 13, 17, 21, 23, 25, 27, 29, 33, 43, 45, 47, 48, 87, 88, 90
- Section 7.4 pg. 491 31, 33, 45, 49, 53, 55, 59, 61, 69, 73, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 121, 123, 124

Exponential and Logarithmic Models

**Homework:**
- Section 7.5 pt. 502 1-6, 11, 12, 14, 31, 33, 37, 38, 39, 41, 44, 48, 69, 90
- handout

**TEST 3**

Polar Coordinates

**Homework:**
- Section 12.5 pg. 763 1, 5, 9, 21, 33, 39, 49, 51, 55
- Section 12.6 pg. 768 13, 17, 21, 27, 33, 39, 45

Implicit Differentiation

**Homework:**
- Section 4.5 pg. 297 1, 3, 7, 8, 18, 23, 25, 32, 33, 37, 42, 45, 46
- Section 11.2 pg. 685 65, 66, 67, 69

Conic Sections, Parabolas

**Homework:**
- Section 12.1 pg. 730 7, 9, 13, 19, 29, 43, 51, 57, 75, 77, 83, 85
- Handout pg. 102 in notes

Conic Sections, Ellipses

**Homework:**
- Section 12.2 pg. 738 1, 3, 7, 11, 15, 17, 25, 29, 31, 35, 39, 47, 51, 53, 55, 57, 59, 60, 61, 63, 65, 69
- Handout pg. 108 in notes
Conic Sections, Hyperbolas

Homework:
Section 12.3  pg. 747  1, 2, 3, 4, 5, 11, 13, 15, 17, 19, 21, 25, 27, 35, 43, 45, 57, 51, 53, 55, 61
Handout  pg. 115 in notes

Polar coordinates of Conic Sections

Homework:
Section 12.7  pg. 755  1, 2, 3, 4, 11, 19, 25, 29, 33, 37, 39, 42, 53

TEST 4

Related Rates

Homework:
Section 4.6  pg. 304  1, 5, 15, 19, 22, 25, 27, 30, 31, 36, 37
Section 11.2  pg. 685  75, 101, 102

Related Rates with Laws of Sines and Cosines

Homework:
Handout  pg. 130 in notes

The Mean Value Theorem for the Derivative and Integrals

Homework:
Section 5.2  pg. 326  1, 7, 11, 15, 19, 21, 23, 25, 29, 31, 39, 41
Section 6.4  pg. 429  37, 39, 41
Section 11.2  pg. 685  81, 83, 84

Linear Approximations and Differentials

Homework:
Section 5.8  pg. 379  1, 3, 5, 7, 9, 13, 17, 27, 29, 33, 37
Section 11.2  pg. 684  71, 73, 104

Optimization Problems

Homework:
Section 5.7  pg. 369  11, 13, 16, 27, 28, 40, 41, 45, 47, 49
Section 11.2  pg. 685  77, 105

TEST 5

Review I  Handout  pg. 152 in notes
Review III  Handout  pg. 170 in notes
Review II  Handout  pg. 161 in notes
Review IV  Handout  pg. 179 in notes
Learning Objectives

Upon successfully completing this course, students should have the following knowledge and skills:

1. Be able to evaluate limits of rational and radical functions including one-sided limits, infinite limits and limits at infinity.
2. Understand the concept of the limit.
3. Be able to discuss the continuity and points of discontinuity of rational and radical functions.
4. Understand the concept of the derivative.
5. Be able to differentiate and integrate rational and radical functions.
6. Be able to explain and illustrate the Fundamental Theorem of Calculus.
7. Be able to apply knowledge of integration to finding area.
8. Be able to apply knowledge of differentiation to curve sketching and maximum-minimum problems involving rational and radical functions.
9. Be familiar with logarithmic and exponential definitions and properties and use them in relevant applications.
10. Be able to apply knowledge of differentiation to related rate problems.
11. Be able to apply knowledge of differentiation and integration to solving rectilinear motion problems.
12. Be able to state and explain and illustrate the Mean Value Theorem, and the Fundamental Theorem of Calculus.
13. Be able to understand conic sections using algebra and differentiation.
14. Be able to use the TI-84 plus graphing calculator in relevant Calculus and Precalculus concepts.