

Day 1 – Limits, Continuity, and Differentiation Review

- ✓ When does a limit exist?
- ✓ Computing limits
- ✓ When is a function continuous?
- ✓ What is a derivative?
- ✓ When is a function differentiable?
- ✓ What is the relationship between continuity and differentiability?
- ✓ Differentiation formulas
- ✓ The Chain Rule
- ✓ Implicit differentiation
- ✓ Related rates problems

Day 2 – Curve Sketching and Optimization

- ✓ Increasing and decreasing intervals, 1<sup>st</sup> derivative test
- ✓ Local extrema, critical points
- ✓ Optimization problems
- ✓ Higher-order derivatives
- ✓ Concavity and points of inflection, 2<sup>nd</sup> derivative test

Day 3 – Integration review

- ✓ Basic integration rules
- ✓ U-substitution
- ✓ Area between curves
- ✓ Volume of revolved solids

Current topics:

- ✓ Integration by parts
- ✓ Trigonometric Integrals

## M408C Syllabus – Spring 2016 – From UT Math Department

### 1 Functions and Models

- 1.5 Exponential Functions
- 1.6 Inverse Functions and Logarithms

### 2 Limits and Derivatives

- 2.1 The Tangent and Velocity Problems
- 2.2 The Limit of a Function
- 2.3 Calculating Limits Using the Limit Laws
- 2.4 The Precise Definition of a Limit
- 2.5 Continuity
- 2.6 Limits at Infinity; Horizontal Asymptotes
- 2.7 Derivatives and Rates of Change
- 2.8 The Derivative of a Function

### 3 Differentiation Rules

- 3.1 Derivatives of Polynomials and Exponential Functions
- 3.2 The Product and Quotient Rules
- 3.3 Derivatives of Trigonometric Functions
- 3.4 The Chain Rule
- 3.5 Implicit Differentiation
- 3.6 Derivatives of Logarithmic Functions
- 3.7 Rates of Change in the Natural and Social Sciences (optional)
- 3.8 Exponential Growth and Decay
- 3.9 Related Rates
- 3.10 Linear Approximations and Differentials
- 3.11 Hyperbolic Functions (quickly)

### 4 Applications of Differentiation

- 4.1 Maximum and Minimum Values
- 4.2 The Mean Value Theorem
- 4.3 How Derivatives Affect the Shape of a Graph
- 4.4 Indeterminate Forms and L'Hospital's Rule
- 4.5 Summary of Curve Sketching
- 4.7 Optimization Problems
- 4.9 Antiderivatives

### 5 Integrals

- 5.1 Areas and Distances
- 5.2 The Definite Integral
- 5.3 The Fundamental Theorem of Calculus
- 5.4 Indefinite Integrals and the Net Change Theorem
- 5.5 The Substitution Rule

### 6 Applications of Integration

- 6.1 Areas between Curves
- 6.2 Volume
- 6.3 Volumes by Cylindrical Shells (optional)
- 6.4 Work (optional)
- 6.5 Average value of function (optional)