Study Guide for First Calculus II Exam

March 2, 2012

The first exam will cover material from the following sections from Stewart’s text (7e): 4.3 and 6.1 – 6.6 and 6.8.

Note that old exams are posted on the course webpage. The exam from 2006 contains problems about ‘function growth’ for which you are not responsible.

1 Computing Limits, Differentiation and Integration Exercises = 60 percent

• Exponential Growth/Decay problem
• Apply FTC(I) to find a derivative
• Use logarithmic differentiation
• Know how to differentiate \( \ln u, \ e^u, \ a^u, \ \log_a u \), where \( u \) is a function of \( x \). Am I missing any???
• Know how to evaluate integrals of the form \( \int a^u du, \ \int \frac{du}{u}, \ \int e^u \) where \( u \) is function of \( x \).
• Apply L’Hospital’s rule
• Know 7 different indeterminate form, and know how to handle each.

2 Definitions and Theorem Statements = 20 percent

• one-to-one function
• inverse function
• L’Hopital’s Rule
• Fundamental Theorem of Calculus (Part I)
• Fundamental Theorem of Calculus (Part II)
• Definition of \( \ln x \) as the area under a curve
• Mean Value Theorem
• Mean Value Theorem for Integrals
• Limit definition of derivative
• Integral definition of the number \( e \)
• Theorem 7 of Section 7.1
• others???

3 Theory = 20 percent

Be able to apply definitions and theorems. Possible problems include:

• Be able to prove the differentiation formula for the inverse trigonometric functions: \( \sin^{-1} x, \cos^{-1} x, \tan^{-1} x \).
• Proof of FTC Part I
• Proof of (simple form) of L’Hopital’s Rule
• Proof of Mean Value Theorem for Integrals