Calculus I

Final Exam - Review

The final exam will be cumulative, covering the sections of Stewart's text, *Single Variable Calculus, 6e*, that we covered. Material from Sections 6.1, 6.2, 6.5 and 7.2* which we covered since the last midterm might be overly represented on the exam. Exam date is Saturday, May 16— start time is 2:00pm, finish time is 5:00pm, location is Waner 202. As you prepare for the exam, please remember the writing expectations that I have set forth.

I will be available for your questions throughout next week, stop by or make an appointment via e-mail. I will announce specific hours next week via e-mail.

Chapter 6 and 7

Definitions and facts to know

- natural logarithmic function defined as an integral
- laws of logarithms
- the number e, Euler's constant

Theorems to know

- The Mean Value Theorem for Integrals

Computational problems

- Find derivatives of functions of the form $\ln u$, where u is a function of x.
- Find integrals of the form $\int \frac{du}{u}$ where u is function of x.
- Find the area between two curves
- Find the volume of a solid
- Find the average value of a function

Proofs

- Prove the Laws of Logarithms (as given as Theorem 3 in Section 7.2*
- Prove that $d(\ln x)/dx = 1/x$.

Past Material

Definitions and facts to know

- Limit - "loose" definition and precise definition
- continuous at a number a
- tangent line
- derivative of a function f (at a number a)
- absolute maximum, maximum value, absolute minimum, minimum value
- local maximum, local minimum

Theorems to know

- The Squeeze Theorem
- The Intermediate Value Theorem
- Theorem 8 of Section 2.5
- Extreme Value Theorem
- Fermat's Theorem
- Rolle's Theorem
- Mean Value Theorem for derivatives
- Closed Interval method
- Fundamental Theorem of Calculus, Part 1
- Fundamental Theorem of Calculus, Part 2
- The Net Change Theorem
- The Mean Value Theorem for Integrals

Computational problems

- Be able to find the derivative of a function using any one of the following rules: sum, difference, constant multiple, product, quotient, chain.
- Know the derivative of $\sin x$ and $\cos x$ and be able to find the derivatives of the other four trigonometric functions using some rule of differentiation.
- Be able to find a derivative using implicit differentiation.
- Find critical points. Use the first derivative test and/or second derivative test determine nature of a critical point.
- Compute limits at infinity to determine horizontal asymptotes.
- Sketch a function by method introduced in Section 4.5: find domain, x-intercepts, y-intercept, symmetry, horizontal and vertical asymptotes, intervals of increase and decrease, local maximum and minimum, concavity and points of inflection.
- Find the antiderivative of a polynomial and $\sin x$ and $\cos x$ and know the table of indefinite integrals on page 325
- Find indefinite integrals using the substitution rule

Proofs

- $\epsilon - \delta$ proof for computing a limit
- Find the derivative of a polynomial using the limit definition of the derivative.
- Prove Rolle's Theorem
- FTC, Part 1