Calculus I

Exam 2 - Review

The second exam will cover section 3.9 and chapter 4 of Stewart’s text, *Single Variable Calculus, 6e* except for section 4.6. Exam date is Tuesday, April 7th — start time is 11:00am, finish time is 12:30pm. The exam will include several computational problems and one proof. There will definitely be a question from section 4.5 asking you to “put it all together” and a question from section 4.7. I may also explicitly ask for a definition or theorem statement. The chapter review provides a good source of problems for practice and consideration. As you prepare for the exam, please remember the writing expectations that I have set forth. Class-time on April 6th is devoted to your questions.

**Definitions and facts to know**

- differential
- absolute maximum, maximum value, absolute minimum, minimum value
- local maximum, local minimum
- limit at infinity and \( \lim_{x \to \infty} \frac{1}{x^r} = 0 \) for \( r > 0 \) a rational number.

**Theorems to know**

- Extreme Value Theorem
- Fermat’s Theorem
- Rolle’s Theorem
- Mean Value Theorem
- Closed Interval method

**Computational problems**

- Find the linear approximation (linearization) of a function.
- 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 \( \cos x \).

• Apply Newton’s method to approximate the root of a polynomial.

Proofs

• Prove Fermat’s theorem

• Prove Rolle’s Theorem

• Prove the Mean Value Theorem