Midterm Exam 2

Dec 08, 2015, 10:10AM

Firstly, review all the homework problems and quiz problems and midterm 01 problems. Read the solution and make sure you understand every mistake you made.

1. What is the meaning of linear approximation in terms of the sizes of $f(x) - L(x; x_0)$ vs $|x - x_0|$? How is linear approximation related to differentiability?

2. How to find approximation using linearization? (such as in section 3.11, problem 7-18) How to estimate the error of approximation? (formula not in the textbook, but given in class and homework)

3. Study the proof of Rolle's Theorem and Mean Value Theorem.

4. Find local (global) min/max of the function f on $[a, b]$. Pay attention to the first derivative test in section 4.3 and the outline in page 263.

5. Graph the function $y = f(x)$ on $[a, b]$ or on R. Use all the information from $f'(x)$ nd $f''(x)$ to determine the details of the graph.

6. What are typical applications of the Mean Value Theorem?

7. Find $\lim_{\cdots} \cdots$ using L'Hôpital's Rule. (check study guide for Chap 04 about variants and limitations of L'Hôpital's Rule).

8. What is going on on Fig 4.49, p277? This example shows, in general, how Newton's method fails to converge if x_0 is too far away from x_*.

9. How many extra conditions does one need in order to solve $y'(x) = f(x)$? how many for $y''(x) = g(x)$? check section 4.8, problems 91-113.

10. Express $\int_a^b f(x)dx$ as limit of Riemann sum, and vice versa (identify a limit of Riemann sum as a definite integral).

11. Fundamental Theorem of Calculus (both parts), statement, proof and application.

12. Evaluate $\int f(x)dx$. Here f could be the derivative of an elementary function, or derivative of composition of elementary functions using the chain rule.

13. About 15-20 points from week 1-5.