

Math Xa

Reviewing for Midterm II

Fall 2004

Topics

Midterm II will cover the first eleven chapters in *Calculus: An Integrated Approach to Functions and Their Rates of Change*, with emphasis on Chapters 5–11. More specifically, you will be responsible for the following topics.

- To understand the derivative as the slope of a tangent line to the graph of a function.
- To understand the derivative as a rate of change.
- To understand and be able to apply the formal definition of a derivative.
- To understand and be able to use quadratic functions in both a calculus setting and a non-calculus setting.
- To understand the meaning of the second derivative.
- To understand and be able to apply the concept of limit.
- To understand and be able to apply the concept of one-sided limits.
- To understand and be able to apply the concept of continuity.
- To be able to sketch the graph of a curve using information from the first and second derivative.
- To understand and be able to apply the concept of linear approximation.
- To understand the rules of differentiation and begin to work towards fluency.

- $\frac{d}{dx}k = 0$, where k is constant.
- $\frac{d}{dx}kf(x) = k\frac{d}{dx}f(x)$, where k is constant.

$$\begin{aligned}
& - \frac{d}{dx}[f(x) \pm g(x)] = f'(x) \pm g'(x). \\
& - \frac{d}{dx}[f(x)g(x)] = f(x)g'(x) + f'(x)g(x). \\
& - \frac{d}{dx} \left(\frac{f(x)}{g(x)} \right) = \frac{g(x)f'(x) - f(x)g'(x)}{[g(x)]^2}. \\
& - \frac{d}{dx}x^n = nx^{n-1}, \text{ where } n \text{ is an integer.} \\
& - \frac{d}{dx}\sqrt{x} = \frac{1}{2\sqrt{x}}. \\
& - \frac{d}{dx}e^{kx} = ke^{kx}.
\end{aligned}$$

- To understand and be able to apply the concept of an exponential function.
- To understand and be able to apply the First Derivative Test to determine extreme points.
- To understand and be able to apply the Second Derivative Test to determine extreme points.
- To be able to sketch the graph of a function using information from the first and second derivative.
- Understand and be able to determine local and global extrema and apply these techniques to solving optimization problems.
- Understand and be able to analyze cubic and polynomial functions.
- Understand and be able to analyze rational functions, including asymptotic behavior.

Suggested Exercises

- Section 5.1. Exercises 1, 4, 6, 17; pp. 181–187.
- Section 5.2. Exercises 2, 7, 16; pp. 192–194.
- Section 5.3. Exercises 2, 5, 6, 7, 8; pp. 200–205.
- Section 5.4. Exercises 3, 4; pp. 212–215.
- Section 6.1. Exercises 4, 5; p. 222.
- Section 6.2. Exercises 1, 2, 3; pp. 228–230.
- Section 6.3. Exercises 1, 2, 3, 6, 7, 8, 9; pp. 235–237.
- Section 6.4. Exercises 1, 3, 9; pp. 241–243.
- Section 7.1. Exercises 2, 5, 6, 7, 8, 9, 17; pp. 256–258.
- Section 7.2. Exercises 2, 3, 4, 6, 16; pp. 262–265.
- Section 7.4. Exercises 1, 3, 5, 6, 17; pp. 276–278.

- Section 8.1. Exercises 2, 5; pp. 284–285.
- Section 8.3. Exercises 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11; pp. 300–301.
- Section 9.1. Exercises 2; pp. 307–309.
- Section 9.2. Exercises 32, 34, 35, 36, 37; pp. 316–320.
- Section 9.3. Exercises 2, 4, 8; pp. 330–334.
- Section 9.4. Exercises 12, 15; pp. 338–340.
- Section 10.1. Exercises 10, 11, 12, 13, 14, 15, 16; pp. 354–356.
- Section 10.2. Exercises 3, 4, 6, 7, 8, 9, 11, 12; pp. 358–360.
- Section 10.3. Exercises 1, 3, 6, 7, 14, 20; pp. 366–371.
- Section 11.1. Exercises 14–21; pp. 377–379.
- Section 11.2. Exercises 10, 11, 12, 14, 16, 19, 20; pp. 388–390.
- Section 11.3. Exercises 8, 12; pp. 399–403.
- Section 11.4. Exercises 3, 5, 12; pp. 417–420.