

June 27, 2007

MATH10560 Exam 1 Study Guide

PRELIMINARIES

- Comfort with all types of basic integration, especially u-substitution
- Good understanding and ability to use the Integration Table on page 511
- Integrals of $\frac{1}{\sqrt{a^2-u^2}}$, $\frac{1}{a^2+u^2}$, $\frac{1}{u\sqrt{u^2-a^2}}$
- Example:** Find $\int \frac{4x^3+1}{x^4+1} dx$

CHAPTER 7

7.7. Indeterminate forms and L'Hopital's Rule

- Understanding of Figure 1 on page 494 and ability to explain it in your own words
- Evaluate Limits using L'Hopital's rule
- Know how to work with the following forms: $\frac{0}{0}$, $\frac{\infty}{\infty}$, $\infty - \infty$, $0 * \infty$, $\frac{0}{\infty}$, $\frac{\infty}{0}$
- Example:** Evaluate $\lim_{x \rightarrow \infty} \frac{x^2}{\ln x}$

CHAPTER 8

8.1. Integration by Parts

- Derivation of the formulas 1 and 2 on page 512 from the product rule
- Understand and use the form: $\int u dv = uv - \int v du$
- Be careful with signs, +, -
- Example:** Find $\int x^2 \sin x dx$

8.2. Trigonometric Integrals

- Know the strategies for evaluating $\int \sin^m x \cos^n x dx$, $\int \tan^m x \sec^n x dx$, etc
- Know the strategies for evaluating $\int \sin mx \cos nxdx$, $\int \sin mx \sin nxdx$, etc
- Example:** Find $\int \tan^4 x dx$

8.3. Trigonometric Substitutions

- Use $u = a \tan x$, $u = a \sin x$, $u = a \sec x$ and find du
- Know substitutions to replace forms: $a^2 + x^2$, $a^2 - x^2$, $x^2 - a^2$
- Use like u-substitution, remember to substitute back when finished
- Example:** Find $\int \sqrt{1-9t^2} dt$

8.4. Partial Fractions

- Know when to use
- Set up for linear factors (distinct and repeated) and irreducible quadratic factors
- Solve systems of equations to find partial fractions
- Integrate by using partial fractions
- Example:** Find $\int \frac{2x+5}{x^2+5x+6} dx$