MATH1220: Midterm 2 Study Guide

The following is an overview of the material that will be covered on the second exam.

§6.8 Inverse Trig Functions and Their Derivatives

- Deriving the identities from Theorem A (these are the ones that look like $\sin(\cos^{-1} x) = \sqrt{1 - x^2}$).
- The derivatives of the six standard trig functions.
- Integrals involving inverse trig functions (e.g., $\int \frac{3}{\sqrt{5-9x^2}} dx$).
- You will be given the derivatives of the inverse trig functions (see formula sheet).

§6.9 The Hyperbolic Functions and Their Inverses

- The definitions of the hyperbolic functions.
- The derivatives of the hyperbolic functions.
- Integrals involving inverse hyperbolic functions (e.g., $\int \frac{dx}{\sqrt{x^2+1}}$). There are multiple ways to do this integral. If you do a trig substitution (as in §7.4) you will get the algebraic expression for $\sinh^{-1} x$.
- You will be given the derivatives of the inverse trig functions.

§7.1 Basic Integration Rules

- You should be able to integrate anything resembling 1-12, or 16,17 on p384 in the text.
- You will be given 13-15 on the formula sheet.
- You should be (very) comfortable with u-substitution.

§7.2 Integration By Parts

- Using integration by parts in definite and indefinite integrals.
- Recognizing when it is appropriate to try integration by parts.
- Repeated integration by parts.

§7.3 Some Trigonometric Integrals

- Integrals like $\int \sin^n x \, dx$.
- Integrals like $\int \sin^n x \cos^m x \, dx$.
- Integrals like $\int \sin(mx) \cos(nx) \, dx$.
- Integrals like $\int \tan^n x \, dx$.
- You will be given the half-angle formulas and the product identities.

§7.4 Rationalizing Substitutions

- Rationalizing substitutions for integrands involving $\sqrt[n]{ax + b}$.
- Trig substitutions for integrands involving $\sqrt{a^2 - x^2}$, $\sqrt{x^2 - a^2}$, or $\sqrt{a^2 + x^2}$.

§7.5 Partial Fraction Decompotisions

- Integrating rational functions using partial fractions.
- Distinct or repeated linear factors.
- Distinct or repeated quadratic factors.
- The logistic differential equation will *NOT* be covered.

§7.6 Strategies for Integration

- Determining which technique(s) you should use to evaluate an integral.

§8.1 Indeterminate Forms of Type 0/0.

- L'Hôpital's Rule and applications.