Math 262
Exam 3 Review Sheet

Section 8.1 Integration by Parts

• Know and be able to apply integration by parts (along with other techniques) in order to evaluate integrals.
• Understand how to apply integration by parts multiple times in order to evaluate integrals.

Section 8.2 Trigonometric Integrals

• Understand how to rewrite integrands involving trigonometric functions using Pythagorean identities.
• Understand how to rewrite integrands involving trigonometric functions using half angle (power reduction) identities.
• Be able to evaluate various integrals involving powers of $\sin x$, $\cos x$, $\sec x$ and $\tan x$.

Section 8.3 Trigonometric Substitutions

• Understand and be able to carry out the basic process of trigonometric substitution.
• Understand the integral forms for which each type of trigonometric substitution is useful.
• Understand how to use a right triangle to translate the results of carrying out a trigonometric substitution back in terms of the original variable.

Section 8.4 Integrals of Rational Functions by Partial Fractions

• Be able to carry out long division of polynomials and know when to apply this procedure to an integrand (when the degree of the numerator of a rational function is greater than or equal to that of the denominator).
• Understand how to find the partial fractions decomposition of a rational function whose denominator factors (for both linear and irreducible quadratic factors).
• Understand how to combine long division, partial fractions, algebra, and inverse trigonometric functions to integrate various rational functions.
• Understand how to use completing the square to change the form of an integral involving a quadratic term.
• Be able to recognize which of our previous integration methods can be applied to integrate a rational function after completing the square.

Section 8.7 Improper Integrals

• Be able to use limits to determine whether or not an integral with an infinite limit of integration converges or diverges.
• Be able to use limits to determine whether or not an integral with an infinite integrand [for example, a function on an interval containing a vertical asymptote] converges or diverges.
• Be able to use limits to determine whether or not an integral that has more than one type of improperness converges or diverges.
• Be able to *comparisons* to determine whether or not an improper integral converges or diverges.