1 Chapter 7: Techniques of Integration

1.1 Section 7.4: Rationalizing Substitutions

1. Linear Polynomial inside the radical
2. $\sqrt{a^2 - x^2}, \sqrt{a^2 + x^2}, \sqrt{x^2 - a^2}$ radical form with trig substitution
3. Complete the square for $ax^2 + bx + c$ forms in the radical.

1.2 Section 7.5: Partial Fractions

Know how to solve the 4 types of rational function integrals using partial fraction decomposition. Distinct linear factors, repeated linear factors, distinct quadratic factors, and repeated quadratic factors. Also be able to solve a logistic differential equation using these techniques.

1.3 Section 7.6: Strategies for Integration

Review the four steps for solving an integral problem on pages 411-412 at the beginning of section 7.6

2 Chapter 8: Indeterminate Forms and Improper Integrals

2.1 Section 8.1: 0/0 Indeterminate form

Know how to use L'Hopitals rule to evaluate limits of the 0/0 indeterminate form.

2.2 Section 8.2: Other Indeterminate forms

Know how to manipulate the other indeterminate forms into 0/0 or inf / inf forms and then use L'Hopitals rule to solve the limit. Remember if you used a natural logarithm to simplify you need to exponentiate your answer.

2.3 Section 8.3: Improper Integrals- Infinite Limits of Integration

Using a limit argument solve the improper integral using the second fundamental theorem of calculus.

2.4 Section 8.4: Improper Integrals- Infinite Integrands

Check to see where the integrand is infinite. If at an endpoint use a limit argument to evaluate. If the integrand diverges at a point in the interior of the integral, split the integral up into 2 pieces so that the divergence is occurring at this new endpoint. Know the p-test (example 4).

3 Chapter 9: Infinite Series

3.1 Section 9.1: Infinite Sequences

Know how to evaluate the limit of an infinite sequence using algebraic techniques, hierarchy arguments, or L'Hopitales rule where applicable. Additionally be comfortable with using squeeze theorem for oscillating sequences.

3.2 Section 9.2: Infinite Series

Know how to calculate partial sums as well as how to calculate the limit of a geometric series. Be able to argue whether a series diverges or converges by grouping terms (like with the harmonic series).

3.3 Section 9.3: Integral Test

Know how to use the integral test to show converge/divergence of a series as well as when you are allowed to use it. Also be familiar with the p-series test.