Study Guide for Chap 10

1. Review the convergence or divergence of $\int_1^\infty \frac{1}{x^p}dx$ for $0 < p < 1$, $p = 1$ and $p > 1$, respectively. Be able to compute them (must!) and better to memorize the results. They play a key role in the convergence test for improper integrals and the convergence test for series with positive terms.

2. Study the definition of convergence of a sequence (page 552).

3. Study and memorize the results of the examples in Theorem 5 of Section 10.1.

4. Study the definition of convergence of a series (page 563).

5. Study the comparison tests in Theorem 10 and Theorem 11 of section 10.4. Practice the convergence tests given in the homework problems. Be able to quickly find which series to compare with the series at hand, then use the comparison tests to get the conclusion.

6. Study the statements and proof of the integral test, bounds for the remainder in the integral test, the ratio test and the root test for series with positive terms ($a_n > 0$), Leibniz's test for alternating series and the Alternating Series Estimation Theorem (error of finite term sum of an alternating series). Then for each of the test, give an example of a series that can be found convergent/divergent using the test.

7. Practice problems 25-40 on page 624 as an overall review on determining convergence/divergence of series..

8. Study the statement of Taylor's Theorem (formula) and its proof.

9. Clarify the relation between a function and its Taylor series. For example, how do you generate a Taylor series from a given function? when and where does a function equal the Taylor series it generates? Examples?

10. Memorize Taylor series of basic functions on page 620. Then perform differentiation/integration on them and see if you can recognize them from the resulting new series. Then practice on examples such as problems 41-52 on page 621 and problems 41-56 on page 624. Also study the multiplication and division of two Taylor series.

11. Review the application of Taylor series in indeterminate forms (problems 29-40 on page 621, problems problems 73-79 on page 624-625), in approximating integrals and the error estimate.