

Here is a list of what you should be able to do from each section.

Sec. 7.7, Inverse Trig Functions: know domains and ranges of inverse sine, tangent, and secant. Know the derivatives, and understand how to calculate things like  $\sin(\cos^{-1}(x))$  or  $\csc^{-1}(\tan(2))$ .

Sec. 8.2, Integration by Parts: know how to do this for both definite and indefinite integrals. You should be able to integrate by parts to find  $\int \ln(x)dx$ , for example.

Sec. 8.3, Integration of products of trig functions: Know how to look for the right u-substitution. You will have all the usual trig formulas available on the front of the test.

Sec. 8.4, Trig substitution: Know which trig function to substitute (if you see  $1 - x^2$ , pick  $\sin u$ ,  $1 + x^2$ , pick  $\tan u$ , etc.).

Sec. 8.5, Partial fractions: Be able to do polynomial long division and partial fraction decomposition. You might have to integrate the partial fractions when you are done as well.

Sec. 10.1, Least upper bounds: You should know the least upper bound axiom, and be able to find the least upper bound for a set. You should also know that you can get find elements in the set that are within  $\varepsilon$  of your supremum.

Sec. 10.2, Sequences: Know the definition of a sequence, and what it means to be increasing, decreasing, monotonic...be able to show that a sequence is any of these things.

Sec. 10.3, Limits of Sequences: You *must* know the definition of the limit of a sequence. Don't just memorize the words, either—understand what the words are saying! You should know that a convergent sequence must be bounded (but not the other way), and if a sequence is nondecreasing and bounded above, it converges (or vice versa). Know the squeeze theorem, and know that you can interchange limits and continuous functions.

Sec. 10.4, Important limits: You should be able to look at all of these and know their limit. You may be asked to prove what the limits of  $x^{1/n}$ ,  $\ln(n)/n$ ,  $x^n$ , or  $n^{1/n}$  are.

Sec. 10.5 and 10.6, L'Hopital: Know when you can use the rule  $(0/0, \infty/\infty)$  and when you can't (any other time). Know which forms are indeterminate  $(0 \cdot \infty, \infty - \infty, 0^0, 1^\infty, \infty^0)$  and which aren't  $(0^\infty, 0/\infty, \infty/0)$ . Remember that  $\infty$  can be your limit of  $f'/g'$  as well.

Sec. 10.7, Improper Integrals: Know what the two types of improper integrals are. If you don't do step one correctly—taking a limit (from one or both sides), it is incorrect, and if you do an integral of an unbounded function without taking a limit, it is incorrect (even if you get the right answer). Know the comparison test as well, when you can apply it, and why it works.

Sec. 11.1: Know the definition of an infinite series, and know what it means for an infinite series to converge to a sum. You must know the difference between the *terms* and the *partial sums* of the series! Know what a geometric series is, when it converges and what its sum is. Know the Basic Divergence Test.

Sec. 11.2: Know how to use the Integral test, the Basic Comparison Test, and the Limit Comparison test. You won't need to prove why any of them work, but you should at least have an idea why they are true (especially for the integral test—think of the picture).

Sec. 11.3: Know how to use the root test and the ratio test to determine convergence. Remember that, if you get 1 in either case, you need to try a different test!

Sec. 11.4: Know the difference between absolute and conditional convergence. Know the alternating series test (remember that  $|a_k|$  has to decrease too). Know how to estimate the error in an alternating series.

Sec. 11.5/11.6: Know how to find Taylor Polynomials and the Taylor series around any point. You should know the series for  $e^x$ ,  $\sin(x)$ , and  $\cos(x)$ , although they are not too hard to figure out if you forget them. You don't need to know the form of the error,  $R_n(x)$ —I'll give you the formula if it comes up—but you should know why it is important.