TOPICS COVERED ON THE FINAL EXAM

The final will be Wednesday, May 13 from 7-10pm. It will have 14-16 questions: several questions will be required, and then there will be a section where you only have to do $n-2$ or $n-1$ of the remaining n problems.

- 6.1: definition of left & right Riemann sums, midpoint sums, trapezoidal sums.
- 6.2: using concavity and monotonicity (increasing or decreasing) to find error bounds of the various sums from 6.1.
- 6.3: using Euler's method to find approximate solutions to initial value problems (IVPs).
- 7.1: find area between curves and arclength. Understand the difference between signed area and area.
- 7.2: find volumes by revolution around an axis or by considering cross sections.
- 7.4: exactly solve IVPs by separation of variables.
- 8.1: integration by parts (pay special attention to example 9 from 8.1.)
- 8.2: be able to integrate rational functions $p(x)/q(x)$, where p, q are polynomials using synthetic division, partial fractions, completing the square.
- 8.3: Be able to use trigonometric identities and substitutions to do integrals. (cf. examples 4 and 8)
- 9.1: Be able to find Taylor polynomials of functions.
- 9.2: Be able to apply Taylor's theorem to find bounds on the approximation error of Taylor polynomials.
- 9.3: Be able to compute Fourier polynomials of a given function.
- 10.1: Know the definition of improper integrals (it involves limits). Know and be able to apply the fact that integrals can be improper at more than one place.
- 10.2: Know the comparison and absolute comparison test for improper integrals. Look especially at "Integrands that change sign" on p. 533, and example 5.
- 11.1: Know what it means for a sequence to converge. Be able to apply the squeeze principle, and the fact that bounded monotone sequences converge.
- 11.2: Know the difference between a sequence and a series. Know what partial sums are and that a series is convergent if and only if the sequence of partial sums is convergent. Know when and to what geometric series converge. The "n^{th} term test for divergence" (theorem 6). Look at example 5 and example 6.
- 11.3: Know the comparison test, the integral test, ratio test. Be able to apply these tests.
- 11.4: Absolute/conditional convergence, and theorem 10. Alternating series test.

- 11.5: Power series: definition, what it means for a power series to converge at $x = a$, differentiating and antidifferentiating a power series. What the interval and radius of convergence is and how to find it.
- 11.6: Using IVP's to evaluate power series (cf. example 5). Be able to find power series for functions from a given one. (eg. find the power series of $x^2 \sin(x^3)$.)
- 11.7: Be able to find Taylor and Maclaurin series for a function directly from the definition. Be able to use Taylor's theorem to show that the Taylor series of f converges to f.
- V.1: Vectors, norm, vector valued functions, differentiating and integrating vector valued functions, arc length.
- V.2: Be able to plot points in polar coordinates, convert from rectangular to polar or vice versa.
- V.3: Finding slope of a tangent to a polar function, find area of the sector traced by a polar function (know what this means).