Math 114-01/02,   Final Exam Study Guide

Logistical Information

- 1:30 pm - 3:30 pm Thurs May 19, OWS 257

- Most problems will be similar to problems on homework and previous exams.

- There will be one fill-in-the-blank question with 20-40 blanks.

- No calculators, notes, books, cell phones permitted.

- Bring whatever you need to help yourself concentrate for 2 hrs: watch, water bottle, granola bar . . .

Basic Facts and Formulas To Know:

- Local linearization and Taylor polynomials

- Taylor series for e^x, $\cos x$, $\sin x$, $\ln(1 + x)$ about $x = 0$.

- Trapezoidal Rule and Simpson's Rule

- Integration by parts formula, form of partial fractions decomposition, Pythagorean identity

- L'Hopital's Rule, using limits for improper integrals

- Velocities, speed, distance traveled for particle moving in the plane

- Basic formulas and concepts for applications: average value, total mass, work, etc.

- Convergence/divergence of sequences of the form x^n or $1/n^p$.

- Sum of finite geometric series $a + ax + \cdots + ax^n$, sum of infinite geometric series $a + ax + ax^2 + \ldots$

- Harmonic series: what it is and that it diverges.

- Convergence/divergence of series of the form $\Sigma\, 1/n^p$ (p-series).

Derivatives, Integrals, and their Connection

- Derivatives: interpretation as rates of change, Taylor polynomials and polynomial approximations, including linear and quadratic approximation (2.4, 3.9, 10.1)

- Definite Integrals: interpretation as accumulated net change, numerical approximation (5.1, 5.2, 7.5)

- Fundamental Theorem: using antiderivatives to evaluate definite integrals and using definite integrals to construct antiderivatives (5.3, 6.1, 6.4)

- Differential equations: finding general solutions using antidifferentiation or separation of variables, finding particular solutions, slope fields and solution curves, writing a differential equation to model growth or decay, half-life, equilibrium solutions (6.3, 11.1, 11.2, 11.4, 11.5)

Techniques of Integration, Parametric Equations, Applications of the Integral

- Techniques of Integration: substitution, ibp, partial fractions, trig substitution (7.1, 7.2, 7.4)

- Parametric Equations: parametric equations of motion: velocities in x and y directions, speed, distance traveled; parametric curves: slope, concavity, area, arclength (4.8, supplementary notes, 8.2)

- Applications of the Integral: average value, area, volume, arclength, density, center of mass, work, hydrostatic pressure/force, income stream, consumer/produce surplus (5.4, 8.1, 8.2, 8.4, 8.5, 8.6)

Limits, Improper Integrals, Sequences, Series, Power Series, Applications of Series

- Limits and Improper Integrals: the limit of the values of a function, infinite limits, limits at infinity, indeterminate forms, L'Hopital's rule, convergent and divergent integrals (1.8, 4.7, 7.6)

- Sequences: ways of representing a sequence, convergence of a sequence (9.1)

- Geometric Series: partial sum formula, convergence/divergence, sum of convergent geometric series, applications involving geometric series (9.2)

- Series: difference between a series and a sequence, difference between the convergence of a series and the convergence of the sequence of its terms, the sum of the series as the limit of partial sums (9.3)

- Power Series: ratio test, radius of convergence (9.4, 9.5)

- Taylor Series: finding Taylor series using derivatives, finding Taylor series by substitution or multiplication, using Taylor series in applications (10.2, 10.3)

Additional Practice Problems for Ch 9 and 10:

Ch 9 Rev: 1, 2, 6, 7, 9, 12, 21, 22, 23, 37, 42, 43, 45, 49, 56, 58-61, 72, 73, 75, 80, 95, 97
Ch 10 Rev: 1-4, 6, 7, 11-18, 23, 24, 26, 30, 33, 36, 37, 44, 45, 47, 49