Final Exam Review

Mon May 4 12:53:43 PDT 2009 Version 1

Please know the following for the Final Exam Monday, May 11 from noon to 2pm in AB634.

Most problems will be repeats of problems from quizzes and exams with minor modifications. Be able to do all problems and proofs from the quizes, homework and exams.

1. Derivatives
   a. Know the chain rule, product rule and quotient rule.
   b. Know the derivative of common functions including e^x, $\ln x$, $\sin x$, $\cos x$, $\tan x$, $\arcsin x$, $\arccos x$ and $\arctan x$.
   c. Related rates and maximization problems from quizzes and first review sheet.
   d. Know differentiation problems from the first review sheet.
2. Integrals
   a. Know integration techniques of u substitution, integration by parts and partial fractions decomposition.
   b. Know $\int e^x dx$, $\int \ln x\, dx$, $\int \sin x\, dx$, $\int \arcsin x\, dx$, $\int \cos x\, dx$, $\int \arccos x\, dx$, $\int \tan x\, dx$, $\int (1/\sin x)dx$, $\int (1/\cos x)dx$, $\int \arctan x\, dx$ and $\int \big(1/(1+x^2)\big)dx$.
   c. Know integration problems from the first review sheet.
3. Proofs and Theorems
   a. Be able to state Part I and Part II of the Fundamental Theorem of Calculus.
   b. Be able to state Taylor's Theorem as given in Theorem 7.6 on page 279 and Lagrange's form of the remainder given on page 283.
   c. Be able to use Taylor's theorem to show e is irrational.
   d. Proof of the weighted mean-value theorem for integrals.
   e. Be able to prove Theorem 7.11 on page 301 of the book.
   f. Proof that an increasing sequence which is bounded must converge.
   g. Proof that if a_n is a monotonic decreasing sequence with limit 0, then the alternating series $\sum_{n=1}^{\infty}(-1)^{n-1}a_n$ converges.

4. Taylor's Theorem
    a. Use Taylor's Theorem to approximate as in problems 4 and 5 on page 285.
    b. Be able to define o-notation as on page 286.
    c. Be able to state the Taylor series on page 287 using o-notation.
    d. Use o-notation to evaluate limits as in Section 7.13.
5. Differential Equations
    a. Know how to solve linear, separable and homogeneous first order ordinary differential equations from sections 8.5, 8.24 and 8.26.
    b. Know story problems 4, 8 and 9 on pages 321–322.
6. Infinite Series
    a. Know the comparison, limit comparison, integral, ratio, root and alternating series tests and how to apply them.
    b. Sum of the geometric series.
    c. Apostle page 398 problems 4, 7, 8
    d. Apostle page 402 problems 1, 4, 7