MAT 132 - Final topics- Fall 2006

Integration

1. Substitution rule.

2. Integration by parts

3. Additional techniques of integration:

   (a) Trigonometric integrals (example $\int cos^4(x)dx$)

   (b) Trigonometric substitution (example: solve the integral $\int \sqrt{9-x^2}dx$ using the substitution x=3 sin(u))

   (c) Partial fractions. (It will be possible to solve these problems without long division of polynomials)

4. Approximate integration

   (a) Midpoint rule.(We will not ask to compute errors)

   (b) Trapezoidal rule.(We will not ask to compute errors)

   Application of Integration

5. Area between curves

6. Volumes (It will be possible to solve these type of problems with the "disk method")

7. Arc length: Find the arc length of curves which are one of the following types

   (a) graph of functions

   (b) parametric

8. Average value of a function

9. Applications to physics and engineering: Only spring problems

   Differential equations

10. Definition, initial conditions

11. Direction fields

12. Separable equations

13. Exponential growth: Only radioactive decay.

14. Second order linear homogenous equations (From the notes)

    Sequences and series

15. Sequences (convergence, sum, multiplication, bounded, decreasing, increasing). Monotonic sequence theorem.

16. Series: Convergence and divergence Important series to remember (and know when they are convergent or divergent)

    (a) Geometric $\sum ar^n$

    (b) p-series $\sum \frac{1}{n^p}$ (A particular example is the harmonic series)

17. Tests and theorems for convergence and divergence of series

    (a) Adding two series an multiplying a series by a constant.

    (b) If $a_n \nrightarrow 0$ then $\sum a_n$ divergent.

    (c) Comparison test and limit comparison test

    (d) Alternating series test

    (e) If a series is absolutely convergent then it is convergent.

    (f) The ratio test.

18. Power series: radius and interval of convergence. (Review of absolute value might be useful)

19. Representation of functions as power series (Write $\frac{1}{1-x}$ as a power series, differentiating and integrating a power series.)

20. Taylor and Maclaurin Series