Review Topics for Math 21C*

Chapter 10

1. limits of sequences
   a. limits using L'Hospital's rule
   b. limits involving {(1+a/n)^n}
2. sequence of partial sums of a series
3. the sum of a convergent geometric series
4. the Divergence Test [or nth term test for divergence]
5. Tests for positive-term series
   a. Integral Test
   b. Comparison Test
   c. Limit Comparison Test
   d. Ratio Test
   e. Root Test
6. Alternating Series Test (and estimating the error)
7. Absolutely convergent, conditionally convergent, and divergent series
8. Interval of convergence and radius of convergence for a power series
9. Taylor Series Formula
10. Finding a power series from a known series using
    a. substitution
    b. integration
    c. differentiation
11. Approximating definite integrals using Maclaurin series
12. Approximating function values using a Taylor polynomial
13. Taylor's Remainder Theorem [or Lagrange's form of the remainder]
14. Multiplying and dividing power series
15. Finding a power series using the formula for the sum of a geometric series
16. Finding limits using Maclaurin series

Chapter 12

1. equation for a sphere
2. angle between 2 vectors
3. orthogonal vectors
4. projection of u onto v
5. scalar component of u in the direction of v
6. writing a vector as a sum of orthogonal vectors
7. cross product
8. area of a parallelogram or a triangle (using the cross product)
9. triple scalar product and volume of a parallelepiped
10. triple vector product
11. parametric equations for a line
12. distance from a point to a line
    a. using the Pythagorean Theorem
    b. using the cross product
13. equation of a plane through 3 points, or containing a line and a point
14. determining the point of intersection of a line and a plane
15. finding the line of intersection of 2 planes
16. distance from a point to a plane
17. angle between 2 planes

Chapter 14

1. domain and range of f(x,y)
2. finding the limit of a function of 2 variables
   a. using algebraic simplification
   b. using the 2-path method (to show the limit doesn't exist)
   c. using polar coordinates
3. limit definition of partial derivatives
4. calculating partial derivatives
5. the Chain Rule
6. finding partial derivatives of functions defined implicitly
   a. using implicit differentiation
   b. using the Chain Rule
7. gradient vectors
8. directional derivatives
9. tangent plane to a surface
10. normal line to a surface
11. tangent line to the curve of intersection of two surfaces
12. linearization of f(x,y) at (a,b)
13. approximating change in function values
    a. using differentials
    b. using directional derivatives
14. critical points of f(x,y)
15. Second Partial Derivatives Test for local extrema
16. testing critical points where D=0
    a. using two paths to show the point is a saddle point
    b. using completing the square to show the point gives a local max. or min. (or to find a path to help show the point is a saddle point)
17. absolute extrema on a closed, bounded region
18. Lagrange multipliers
    a. with one constraint
    b. with two constraints

Chapter 13

1. velocity, acceleration, speed, direction of motion
2. differentiation rules for vector functions
   a. product rules (3 versions)
   b. chain rule
3. tangent line to a curve at a point
4. integration of a vector function
5. projectile motion

*(This list of topics is not comprehensive, so there might be one or two problems on the final which cover topics that are not on this list.)