Review Sheet for second exam

Math 2210-4, March 30, 2005

Our second exam is on Monday April 4, in class, from 11:50-12:50. The exam will cover sections 14.7-16.5 from our text. Of course we are building on the material from earlier in the course, so you'll be expected to be comfortable with vectors, curves, chain rule, etc. In the outline below you are responsible for each topic! We will go through this sheet on Friday April 1.

Cylindrical, **Spherical** (and **polar**) coordinates. (14.7)

converting between these coordinate systems and Cartesian (x,y,z) coordinates
describing surfaces and regions using these coordinate systems

Differentiability for functions of several variables (Chapter 15)

functions of two or three variables (15.1)
the graph z=f(x,y). Contours on the graph.
level curves of f(x,y), in the domain
level surfaces of the function f(x,y,z), in the domain

partial derivatives (15.2)
definition:
meaning in terms of rate of change of function in coordinate directions.
how to compute partial derivatives
interpretation of partial derivatives as slope of trace curve, for functions of two variables.
higher order partial derivatives; equality of mixed partials.

limits and continuity (15.3)
definitions, meaning.

differentiability (15.4-15.7)
definition and meaning:
which functions are differentiable?
tangent function, tangent plane
differential approximation (15.7)

directional derivatives (15.5)
definition and meaning
how to compute with the gradient
relation of gradient to level curves and level surfaces - tangent planes revisited

chain rule! (15.6)

Max-min problems (15.8-15.9)
Continuous functions on closed and bounded sets attain their extrema - where?
Critical points in the interior - how to find them?
Second derivative test
Lagrange method for constrained optimization problems (15.9)

Multiple Integration (Chapter 16)

Double integrals over rectangular domains
definition and meaning, properties (16.1)
how to compute as iterated integrals (16.2)

Double integrals over non-rectangular domains (16.3-16.4)
iterated integrals for vertically or horizontally simple domains (16.3)
double integrals in polar coordianates (16.4)

Applications of double integrals (16.3, 16.5)
volumes, mass, center of mass, moments of inertia