Review sheet for quiz 2

The quiz will cover §11.3, 11.4, 11.5, 11.6 and 10.5. Here is a list of topics that will be emphasized, some topics in the text that will NOT be on the quiz, and some suggested practice problems.

§10.5-parametric surfaces. You should know:

- a parametric surface in 3-space is given by a vector function $\vec{r}(u,v) = <x(u,v), y(u,v), z(u,v)>$.
- holding u or v fixed gives the *grid lines* on a parametric surface
- how to write down the parametric equations for surfaces of revolution and for the graph of a function $f(x,y)$.

Practice problems: pg. 733 #17, 19, 27 (just write down the parametric equation).

§11.3-partial derivatives You should know:

- the definition of the partial derivatives as a limit of difference quotients.
- the definition of the partial derivatives in terms of derivatives of functions of 1-variable
- the meaning of the partial derivative as a rate of change.
- how to compute partial derivatives of a function given as a formula, and how to numerically estimate partial derivatives of a function given by a table of values, or from the graph of level curves.
- partial derivatives for functions of 3 or more variables
- higher partial derivatives, notation, how to compute them, Clairault's theorem.

You don't need to know about: partial differential equations, the Cobb-Douglas production function, or implicit differentiation.

practice problems: pg. 766-7 #3, 8, 11, 15, 35, 47

§11.4. Tangent planes and linear approximations. You should know

- how to find the equation of the tangent plane to the graph of a function at a given point.
- the linear approximation formula and how to use it to approximate values of a function
- what it means for a function to be differentiable, and how to tell if a function is differentiable
- the differential of a function
- linear approximations for functions of three or more variables
- how to find tangent vectors and the equation of a tangent plane to a parametric surface

practice problems: pg. 778-9 #1, 11, 13, 17, 25

§11.5. The chain rule. You should know

- the chain rule for functions of two variables, cases, I and II
- how to use the chain rule in computations
- the chain rule (cases I and II) for functions of 3 or more variables

You don't need to know about implicit differentiation

practice problems: pg. 786-7, #7, 9, 19, 29

§11.6. Directional derivatives and the gradient. You should know

- the definition of the directional derivative as a limit, and as the derivative of a function of one variable.
- the meaning of the directional derivative as a rate of change
- the expression for the directional derivative (top of pg. 791, theorem 3).
- the definition of the gradient vector a
- the expression of the directional derivative in terms of the gradient and the given direction vector
- all of the above for functions of 3 variables
- the gradient and the maximum value of the directional derivative
- the gradient as a normal vector to level curves or surfaces
- finding the gradient from a contour diagram of a function.

practice problems: pg. 799-800, #5, 7, 11, 19, 29, 34, 35, 41.