

MAT 397 — SPRING 2005 — EXAM II REVIEW

Note: This is not meant to be a comprehensive review. It is intended to remind you the sorts of things we've worked on, and to give you a chance to ask questions about typical problems. Rather than feed you a bunch of problems, I've just outlined what we've done in the course since the first exam. This will help you make sense of your notes, which are your best resource for studying. The two starred sections are the heart of what we've done. They deserve your full attention.

§14.5 Acceleration and Curvature

- Don't sweat this section too much at the moment. It will be valuable to you when you study for the final, though, since it explains a lot of why we care about **B, N, T**.

§14.6 Surfaces

- how to identify and sketch surfaces by slicing (traces and cross-sections)
- getting equations of surfaces of revolution

§14.7 Cylindrical and Spherical Coordinates

- translating (memorize the dictionaries)
- basic shapes (as on the worksheet, including the even-numbered problems)

§15.1 Functions of 2 or more variables

- domains
- level curves

§15.2 Partial Derivatives

- computing
- interpretation as the slope of the tangent line to the curve given by a cross-section
- double and higher partials

§15.3 Limits and Continuity

- definition of limit in multiple variables
- definition of continuity
- showing a limit does **not** exist at a point

§15.4 Differentiability*

- the definition (local linearity)
- gradients (definition and computations)
- tangent planes
- theorem: if f_x and f_y are continuous near p , then f is differentiable at p .

§15.5 Directional Derivatives*

- definition
- computations
- theorem: $f_{\vec{u}}(p) = \vec{u} \cdot \nabla f(p)$
- gradient gives direction of greatest slope

§15.6 Chain Rules

- computations
- word problems
- application to implicit differentiation

§15.7 Tangent Planes Revisited

- finding them
- finding normal lines
- when the tangent plane is horizontal/vertical/etc.