MVE041 Flervariabelanalys 2015 Passing/Mastery
Week 1

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1 Passing Part

§10.1 and §10.5 Geometry in $\mathbb{R}^n$

- Compute the distance between points in $\mathbb{R}^n$, and points and lines or planes in $\mathbb{R}^n$.
- Describe, write the equations for, and sketch representations of subsets of $\mathbb{R}^3$ including planes, cylinders, spheres, cones, ellipsoids, paraboloids, and hyperboloids, as well related solids.
- Understand the meaning and definition of open and closed balls in $\mathbb{R}^n$.
- Understand the concepts of open set, closed set, complement, as well as interior, exterior and boundary points.

§11.1 and §11.3 Curves and Particle Motion in $\mathbb{R}^n$

- Understand and compute the average velocity, the velocity and the acceleration vectors, as well as the speed, from a parametric curve. Describe and sketch the motion of the corresponding particle.
- Obtain expressions for parametrized curves of intersection in simple cases (e.g. Problem 6 from Section 11.3 of *Adams and Essex*).

§12.1, §12.2, and §12.3 Representations of functions

- Understand the concept of a graph of a function of n variables. Given a function, be able to write as a set, and sketch the graph of the function in an appropriate domain.
- Understand the concepts of domain and range of a function. Given a function, be able to specify its domain and range.
- Understand concept of level surfaces. Given a function be able to describe and sketch specified or representative level surfaces or curves. Understand the relation between the level surfaces and a graph of a function.

Limits and Partial Derivatives

- Be able to give an intuitive description of the limit of a function of two variables. Evaluate the limit of such a function using the usual laws of limits.
- Know the definition of a continuous function.
- Given a function, be able to compute its partial derivatives, and evaluate them at a point. Be familiar with the different notation for partial derivatives.
- Understand and sketch a tangent plane and normal vector to the graph of a function at a point. Given a function, be able to compute the equation of the tangent plane and normal vector at a specified point, and write the parametrized equation for the normal line through that point.

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2 Mastery Part

§11.3

- Obtain expressions for parametrized curves of intersection in more complex cases (e.g. Problem 9 from Section 11.3 of *Adams and Essex*).
- Be able to compute the arclength of a curve in $\mathbb{R}^3$ in simple examples.

§12.1, §12.2, and §12.3

- Be able to state and motivate the definition of a limit of a function of two variables.
- Be able to evaluate a specified limit, and if appropriate show that it exists.
- Determine whether a function is continuous.
- Know and motivate the definition of a partial derivative for a scalar-valued function of two variables.
- Derive expressions for the normal vector and tangent plane.