

Math 380, Section N1

Review Sheet for Final Exam

December 7, 2006

The topics below pertain to the third part of the course. For the previous two parts see the review sheets for the midterms.

1. **Double and Triple Integrals.** Know how to compute them using:

- repeated integrals;
- change of variables and repeated integrals;
- their properties like linearity and concatenation of domains.

Also know the relation between these integrals and areas, volumes and average value of functions.

2. **Arclength and surface area integrals:** These are the ones in which the integrand is a scalar field.

- Know how to reduce them to one variable integrals respectively double integrals via parametrization of the curve respectively surface;
- Know how to manipulate their properties (linearity, concatenation of curves, surfaces) to simplify the calculation.
- Know their relation with the length of curves, area of a surfaces, mean values for functions.

3. **Integrals along curves and surfaces:** These are the ones where the integrand is a vector field.

- Know how to reduce them to one variable integrals respectively double integrals via parametrization of the curve respectively surface;
- Know how to manipulate their properties (linearity, concatenation of curves and surfaces, be careful at orientation for surfaces) to simplify the calculation;
- Know their relation with the work done by a force field, respectively the flux of a vector field;
- Know how to use Green's, Stokes' or divergence theorems to simplify their calculation (careful at the orientation of the surface for the last two theorems).

For vector fields in a plane: know when they are a gradient of a scalar field (potential), know how to compute the potential function and how to use it to calculate the line integrals (work) of the vector field along complicated curves.