Math 138A
Winter 2004

BACKGROUND MATERIAL — II

This document contains further information on background material from the second half of multivariable calculus (the parts dealing with double and triple integrals, line integrals, change of variables, Green's Theorem, *etc.*). As in the previous document, the background references are given using the Department's standard texts for courses in single and multivariable calculus.

MULTIVARIABLE INTEGRAL CALCULUS

Calculus with Analytic Geometry (Seventh Edition), by R. E. Larson, R. P. Hostetler and B. E. Edwards. Houghton Mifflin, 2002.

Multiple integration (§§ 13.1–13.8)

> Double and triple integrals, iterated integrals, elementary physical applications, changes of variables to polar, cylindrical, spherical and more general coordinates.

Vector valued functions of several variables (§§ 14.1, 14.5)

> Vector fields, divergence and curl, parametric equations for surfaces.

Integrals over curves and surfaces (§§ 10.6, 12.7, 13.5, 14.2–14.3, 14.5–14.6)

> Parametrized surfaces, surface area, line integrals, conditions for independence of path, surface integrals, physical interpretations.

Integral identities of vector analysis (§§ 14.4, 14.7–14.8)

> Green's Theorem, the Divergence Theorem, Stokes' Theorem.

Basic Multivariable Calculus, by J. E. Marsden, A. J. Tromba and A. Weinstein

Multiple integration (§§ 5.1–5.6)

> Computations of volumes and Cavalieri's principle, double and triple integrals, changes of variables to polar, cylindrical, spherical and more general coordinates, elementary physical applications.

Integrals over curves and surfaces (§§ 6.1–6.4)

> Line integrals, parametrized surfaces, surface area, surface integrals, flux of a vector field.

Integral theorems of vector analysis (§§ 7.1–7.4)

> Theorems of Green, Stokes and Gauss; conditions for path independence.