

C3NOTES

A Calculus and Maple Supplement

Table of Contents

| | | |
|---------------|--|----|
| C3M0 | Introduction | 1 |
| C3M1 | Three-Dimensional Graphics | 3 |
| C3M2 | Plotting in Cylindrical and Spherical Coordinates | 8 |
| C3M3 | Projectile Motion | 11 |
| C3M4 | Parametric Surfaces | 14 |
| C3M5a | Tangent Planes | 17 |
| C3M5b | The Gradient and Tangent Planes for Level Surfaces of $G(x, y, z) = c$ | 20 |
| C3M6 | Extrema of Functions of Two Variables | 22 |
| C3M7 | Plotting the Domain of a Double Integral | 25 |
| C3M8 | Setting up Double Integrals | 27 |
| C3M9 | Double Integrals in Polar Coordinates | 31 |
| C3M10 | Surface Area | 33 |
| C3M11 | The Evaluation of Triple Integrals by Iteration | 37 |
| C3M12a | Evaluating Integrals Using Cylindrical Coordinates | 41 |
| C3M12b | Evaluating Integrals Using Spherical Coordinates | 44 |
| C3M13 | Potential Functions | 47 |
| C3M14 | Notes on Line Integrals | 49 |
| C3M15 | Notes on Line Integrals - Green's Theorem | 53 |
| | Surface Area Revisited and Surface Integrals | 57 |
| C3M16 | Stoke's Theorem | 60 |
| C3M17 | The Divergence Theorem | 64 |
| | Summary of Maple Commands | 70 |

Acknowledgments

The author wishes to express his gratitude to the U.S. Naval Academy for the partial support received while writing these notes, and to the following colleagues for their assistance and encouragement, for without their help and expertise these notes would not be accessible on the Internet:

Professor Michael W. Chamberlain

Professor James M. D'Archangelo

Professor Mark D. Meyerson

Also, the author is particularly grateful to Louis at Y & Y Inc. for technical assistance and advice on the use of T_EX, the mathematical typesetting system used to produce these notes.

The author wishes to express his considerable appreciation for the assistance and encouragement received from Darren McIntyre of Waterloo Maple Inc.