Ideals, Varieties, and Algorithms—An Introduction to Computational Algebraic Geometry and Commutative Algebra. *By D. Cox, J. Little, and D. O'Shea.* Springer-Verlag, New York, 1992. 512 pp. \$39.95, cloth. Undergraduate Texts in Mathematics series. ISBN 0-387-97847-X.

In algebraic geometry many natural problems, such as those arising in invariant theory, in the solution of polynomial systems of interest to scientists and engineers, and in the computation of syzygies of ideals, lead to computations that prove too tedious to pursue by hand. The widespread availability of powerful, relatively easy to use computers has spurred a return to these basic questions, and a rethinking of what reasonable problems are. Algorithms based on the work of Buchberger and many other mathematicians have led to a wide array of computational algebraic tools that are readily available on many computers.

The very readable, excellent book being reviewed is an introduction to algebraic geometry emphasizing the algorithmic, computational viewpoint. This book will be valuable to many different constituencies.

The core book consists of four chapters covering the correspondence between results on affine varieties and basic commutative algebra, a solid introduction to Grübner bases, resultants, and elimination theory. The book then goes on to sample a number of more advanced topics, including basic material on the kinematics of planar robots, some invariant theory of finite groups, projective varieties, and dimension. All the chapters contain many very good examples and exercises. It will be easy to use this textbook as the basis for an innovative algebraic geometry course for undergraduate mathematics majors or for graduate students in a wide variety of subjects such as computer science and mechanical engineering.

Mathematicians and scientists who are not specialists in computer algebra, and graduate students learning algebraic geometry by one of the many other approaches to the subject will also find this book useful and pleasant reading.

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Sinc Methods for Quadrature and Differential Equations. *By J. Lund and K. L. Bowers.* Society for Industrial and Applied Mathematics, Philadelphia, PA, 1992. x +304 pp. \$42.50, hardcover. ISBN-0-89871-298-X.

This text illustrates the use of *Sinc* methods for solving differential equation boundary value problems. *Sinc* methods are not yet as popular as finite difference or finite element methods, mainly because they are less well understood. The present easy-to-understand Lund–Bowers text should go a long way towards making *Sinc* methods more popular. Most scientists and engineers use calculus to derive their model differential equations, and under this premise solutions to such equations are piecewise analytic in each variable. *Sinc* methods provide a close-to-optimal approximation basis for such spaces of functions. Thus *Sinc* methods have advantages over finite difference, finite element, and spectral methods, particularly for approximating solutions of differential equations that may have singularities on boundaries of regions, for differential equation problems with boundary layers, and for problems over infinite regions. This reviewer is presently teaching out of this text in an advanced undergraduate/graduate course on the solution of partial differential equations.

In Chapter 1, the authors introduce elementary concepts of analytic function theory, conformal mappings, Fourier transforms, and Fourier series—concepts which they use in later parts of the text for the derivation and study of *Sinc* formulas that they require.

In Chapter 2, the authors derive a variety of identities of the Cardinal series,

$$f(x) \approx \sum_{j=-\infty}^{\infty} f(jh)\, sinc\left(\frac{x-jh}{h}\right),$$

with h a positive constant, and

$$sinc(x) - \frac{\sin(\pi x)}{\pi x}.$$

For example, the sum of the above infinite series is identically equal to $f(x)$ whenever f belongs to Paley–Wiener space of entire functions that are of exponential order 1 and type π/h, such that $f \in \mathbf{L}^2(\mathcal{R})$.

The identities of the first part of Chapter 2 become accurate approximations when applied in the second part of Chapter 2 to functions that