BOOK REVIEWS

"CALCULUS AND ANALYTIC GEOMETRY" (Sixth Edition)

By *G.B. Thomas and R.L. Finney*

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From the authors' preface:

"In preparing the *Sixth Edition* from the *Fifth Edition*, we have tried to make calculus easier for people to learn. The number of exercises has nearly doubled ...

"This edition ... contains references at the end of some of the problem sets to a series of twenty-seven Apple II™ microcomputer programs appropriate for students enrolled in calculus courses as well as for engineers, physicists, and others who use calculus as a tool in their work. The programs and accompanying manual are available from Addison-Wesley Publishing Company under the title *A Calculus Student's Microcomputer Toolkit*.... It is to be emphasized ... that ... progress through the text is in no way dependent upon having access to these or any other computer programs.

"The level of rigor of the text is about the same as in earlier editions. ...

"Chapter 1, on the rate of change of a function, has new sections on continuity and on infinity as a limit.

"Chapter 2, on derivatives, now has sections on linear (tangent line) approximations, and on inverse functions and the Picard method for finding roots.

"Chapter 3, on applications of derivatives, begins with new sections on curve sketching, concavity, and asymptotes.

Maxima and minima now precede related rates. The chapter concludes with a section that extends the Mean Value Theorem and develops error estimates for the standard linear and quadratic approximations of functions.

"Chapter 4, on indefinite and definite integrals, begins as it has in the past with differential equations of the form $y' = f(x)$, solved by separation of variables. The chapter contains a new development of the two fundamental theorems of integral calculus, however, and devotes a separate section to the technique of integration by substitution (for both definite and indefinite integrals). It is in this section that differentials are first introduced.

"Chapter 5, on applications of definite integrals, has more art, problems, and worked examples than before, and frequent formula summaries.

"Chapter 6, which introduces the logarithmic, exponential, and inverse trigonometric fucntions, also discusses relative rates of growth of functions. It concludes with a section on applications of exponential and logarithmic functions to cooling, exponential growth, radioactive decay, and electric circuits, and a section on compound interest and Benjamin Franklin's will.

"In Chapter 7, on techniques of integration, the section on improper integrals has been expanded to include comparison tests for convergence. There is also a new section on using integral tables, and the treatment of integration by parts has been moved to the beginning of the chapter.

"Chapters 8 (plane analytic geometry) and 9 (hyperbolic functions) have been shortened somewhat and contain additional art and problems.

"Chapter 10, on polar coordinates, is shorter than before and contains a new technique for graphing polar equations of

the form $r = f(\theta)$.

"The presentation of infinite sequences and series has been moved forward in the book and divided into Chapters 11 and 12. Chapter 11 is devoted to sequences and infinite series of constants, Chapter 12 to Taylor's theorem (as an extended mean value theorem) and power series. Series of complex numbers are mentioned briefly. (An introduction to complex number arithmetic and Argand diagrams appears in Appendix 8.)

"Chapter 13, on vectors, begins with motion in the plane and moves from there to the study of vector algebra and geometry in space.

"Chapter 14, on vector functions and their derivatives, has a new treatment of tangent vectors, velocity and acceleration, and concludes with a section on Kepler's laws of planetary motion.

"Chapter 15, on partial derivatives, has new treatments of limits of functions of two variables, continuity, surfaces, partial derivatives, chain rules, directional derivatives, linear approximation and increment estimation, maxima and minima (both constrained and free), Lagrange multipliers, exact differentials, and least squares. Computer graphics have made it possible to visualize and discuss a number of surfaces that could not have been shown in earlier editions of this book. The chapter also looks briefly at solutions of some of the important partial differential equations of physics (in connection with higher order derivatives) and has a short section on how to apply chain rules when a function's variables are not independent.

"Chapter 16, on multiple integrals, contains a new introduction to the subject, along with more examples, problems, and frequent formula summaries. It concludes with a presentation of surface area based on the notion of gradient.

"Chapter 17, on vector analysis, begins with vector fields, surface integrals, line integrals, and work, and concludes with Green's theorem, the divergence theorem, and Stokes's theorem. In addition to many new examples and problems, the chapter now contains a brief derivation of the continuity equation of hydrodynamics.

"In Chapter 18, on ordinary differential equations, the treatment of linear second order equations with constant coefficients has been expanded to include the method of undetermined coefficients in addition to the method of variation of parameters. The chapter concludes with short sections on power series solutions, direction fields and Picard's theorem, and Euler and Runge-Kutta methods.

"The appendixes include expanded sections on determinants and Cramer's rule, and on matrices and linear equations, as well as new sections on mathematical induction and number systems.

"The text is available in one complete volume ... or as two separate parts ... Both parts contain answers to odd-numbered problems."