like a noncommutative version of the Chern character. This opens up a whole new subject of "noncommutative differential geometry". Furthermore, the algebraic formalism of the behavior of the trace leads one to the theory of cyclic cohomology. "But that is the subject for another book [**Cn 3**]", as Blackadar says at the end of his final chapter. (If you can't guess what the "[**Cn 3**]" refers to then you will have to look it up in Blackadar's bibliography.)

Final verdict: this is an excellent book, combining formidable scholarship, impeccable accuracy, and lucid if succinct exposition. It sets a very high standard for Springer's commendable new series of MSRI Publications.

CHRISTOPHER LANCE

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Applications of Lie groups to differential equations, by Peter J. Olver. Graduate Texts in Mathematics, Volume 107, Springer-Verlag, New York, Berlin, Heidelberg, Tokyo, 1986, xxvi + 497 pp., $54.00. ISBN 0-387-96250-6

A standard introductory textbook on ordinary or partial differential equations presents the student with a maze of seemingly unrelated techniques to construct solutions. Usually these unmotivated and boring techniques constitute the total experience with differential equations for an undergraduate. Faced with a given differential equation which is not a textbook model, one is hopelessly lost without "hints"!

In the latter part of the 19th century Sophus Lie introduced the notion of continuous groups, now known as Lie groups, in order to unify and extend these bewildering special methods, especially for ordinary differential equations. Lie was inspired by lectures of Sylow given at Christiania, present-day Oslo, on Galois theory and Abel's related works. [In 1881 Sylow and Lie collaborated in editing the complete works of Abel.] He aimed to use symmetry to connect the various solution methods for ordinary differential equations in the spirit of the classification theory of Galois and Abel for polynomial equations. Lie showed that the order of an ordinary differential equation can be reduced by one if it is invariant under a one-parameter Lie group of point transformations. His procedures were both constructive and aesthetic.

For ordinary differential equations Lie's work systematically and comprehensibly related a miscellany of topics including: integrating factors, separable equations, homogeneous equations, reduction of order, the method of undetermined coefficients, the method of variation of parameters, Euler equations, and homogeneous equations with constant coefficients. Lie also indicated that