REFERENCES

[A-W] H. Amann and S. Weiss, *On the uniqueness of the topological degree*, Math. Z. **130** (1973), 39–54.

[B-K] G. D. Birkhoff and O. D. Kellogg, *Invariant points in function spaces*, Trans. Amer. Math. Soc. **23** (1922), 96–115.

[E] I. Ekeland, *Nonconvex minimization problems*, Bull. Amer. Math. Soc. (N.S.) **1** (1979), 443–474.

[P] W. V. Petryshyn, *On the approximation solvability of equations involving A-proper and pseudo-A-proper mappings*, Bull. Amer. Math. Soc. **81** (1975), 223–315.

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Asymptotic methods in statistical decision theory, by Lucien Le Cam. Springer Series in Statistics, Springer-Verlag, New York, Berlin, Heidelberg, 1986, xxvi + 742 pp., $49.95. ISBN 0-387-96307-3

It is rather odd that in statistics no "general" theory has yet been formulated that would investigate from a single point of view the properties of estimates, tests and other inference procedures and would be accepted by the majority of specialists. A fundamental concept such as optimality is usually defined *ad hoc* in each special case, depending on the nature of the problem. Therefore, the number of concepts of optimality in statistics grows along with the number of problems treated and models studied. The work of A. Wald, D. Blackwell and others in abstract statistical decision theory has shown how successfully the ideas and methods of the theory of optimization and convex analysis work in statistics. This has led to some systematization of the various concepts of optimality. The development of the asymptotic theory of statistical inference has shown that under mild regularity assumptions various concepts of optimality often lead to the same or almost the same solutions. These ideas have been especially well studied in the more traditional schemes of statistical inference, in which for n independent identically distributed (i.i.d.) observations $X^n = (X_1, \dots, X_n)$ representing a sample of size n from the distribution F_θ, one wishes to estimate the value of the parameter θ or derive a test for verifying some hypothesis about this parameter. The similarity, in such a situation, of these different approaches to the concept of asymptotic optimality is explained by the fact that they all depend on using an appropriate form of the scaled likelihood ratio

$$\frac{dP^n_{\theta+h/\sqrt{n}}}{dP^n_\theta}(X^n) \equiv Z^n_h \equiv Z^n_h(\theta; X^n),$$

where P^n_θ is the distribution of X^n derived from F_θ. Let

$$Z_h = \exp(L_\theta(h) - \tfrac{1}{2}(J_\theta h, h))$$