Schrödinger equation, the neutron transport equation, Maxwell's equations, and the Dirac equation. A notable feature of the book is the treatment of second-order elliptic and parabolic problems in L^2 and L^p spaces. Fattorini does a nice job of explaining the Agmon-Douglis-Nirenberg elliptic machinery (in the second-order case), making it accessible to a wide audience. An important feature of the book is its extensive and useful bibliography occupying more than a hundred pages.

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Bayes theory, by J. A. Hartigan, Springer Series in Statistics, Springer-Verlag, New York, Berlin, Heidelberg, Tokyo, 1983, xii + 145 pp., $16.80. ISBN 0-387-90883-8

A basic problem of statistics is to infer something about a parameter or state of nature θ after observing a random variable x whose distribution p_θ depends on θ. A neat, but controversial, solution to this problem of inference is provided by the Bayesian approach. Assume that θ is a random variable with distribution π *prior* to observing x. The inference is made by calculating q_x, the conditional or posterior distribution of θ, given x. If p_θ and π have probability density functions $f(x|\theta)$ and $g(\theta)$, respectively, then q_x has density $h(\theta|x)$ given by Bayes's formula

$$h(\theta|x) = \frac{f(x|\theta)g(\theta)}{\int f(x|\varphi)g(\varphi)\,d\varphi} \tag{1}$$

or, briefly,

$$h(\theta|x) \propto f(x|\theta)g(\theta). \tag{2}$$

(For simplicity, assume the densities are with respect to Lebesgue measure. However, any σ-finite dominating measure will do.) There is no disagreement about Bayes's formula. The controversy is about its application and its interpretation.

The two major interpretations of the probability of an event E, both of which can be traced back to the seventeenth-century origins of the subject, are as the limiting relative frequency of E in a sequence of trials, or as a measure of the degree of belief in the occurrence of E. For the past half century the majority of probabilists and statisticians have accepted the frequency interpretation, even though it is of limited application and seems somewhat circular in its "dependence" on the law of large numbers. The frequency view is disastrous for Bayesian inference because it rarely happens that prior probabilities make sense as frequencies. They do make sense when viewed as degrees of belief, and this explains why Bayesians are often identified with subjective probability (de Finetti (1974), Savage (1954)). However, there have been, and are, prominent Bayesians who advocate the use of logical or canonical prior