acquaint the reader with a skeleton of methods such as he is apt to encounter in the calculus of variations, rather than to formulate results as generally as possible. The first chapter is devoted to a discussion of various problems, and the derivation of the first order necessary conditions for an extremum. Chapter II treats quadratic problems; in particular, the theory of integral equations with real symmetric kernel and boundary value problems associated with a second order linear differential equation. Chapter III, which deals with sufficient conditions, is extremely brief; nowhere in the lectures is the Weierstrass $\mathcal{E}$-function mentioned. In Chapter IV the work of Lewy (Mathematische Annalen, vol. 98 (1928), pp. 107–124) on the absolute minimum for nonparametric problems in the plane is presented. Chapter V is concerned with harmonic functions and associated boundary value problems; this chapter is preliminary to the discussion of the problem of Plateau and conformal mapping given in Chapter VI. In this last chapter the problem of Plateau is solved for a single contour in three dimensions; the method of proof is that of Courant (Annals of Mathematics, (2), vol. 38 (1937), pp. 676–724).

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Die Zylinderfunktionen und ihre Anwendungen. By R. Weyrich. Leipzig, Teubner, 1937. 5+137 pp.

A cylinder function may be defined as any solution of Bessel's differential equation. They include functions of the first kind, $J_p(z)$, also called Bessel functions, which are regular at $z=0$, and functions of the second kind which are not regular at $z=0$. There has been considerable confusion in the notation and canonical form of the cylinder functions of the second kind. They have been denoted by Y, G, K, and so on, by various authors and often the same notation is used with different meanings. Following the tables of Jahnke and Emde, our author uses the notation $N_p(z)$ for functions of the second kind and calls them Neumann functions. They are the same as those denoted by $Y_p(z)$ by Nielsen and also by Watson. (See Watson, *Theory of Bessel functions*, p. 57, for a further discussion.) In addition there are the Hankel cylinder functions, which are really functions of the second kind, defined by

$$H_p^{(m)}(z) = J_p(z)+i(-1)^{m+1}N_p(z), \qquad m=1, 2, i=(-1)^{1/2}.$$

The importance of the Hankel functions arises from the fact that alone among the cylinder functions $H_p^{(m)}(re^{i\theta})\to 0$ as $r\to\infty$, provided that $m=1$, $0\leqq\theta\leqq\pi$, and that $m=2$, $\pi\leqq\theta\leqq 2\pi$.

One way to introduce cylinder functions is to define them, as above,