Even the choice of words is occasionally careless. Thus on page 18 the author remarks that, in testing a sequence for convergence, we need to know the limit to which it converges. If we know the limit, there can surely be no question of testing the sequence for convergence; but even if we are trying to establish convergence we do not necessarily need to know the limit, as the author points out in his very next sentence. Again, after a student has read on page 20 that " it is nonsense to write $1/n \to 1/n^2$ as $n \to \infty$ " but that " we may be able to use the $\sim$ notation in such a case ", who is to blame him if he writes $1/n \sim 1/n^2$?

The author's use of symbols is sometimes misleading. For example, his class $IR(a, b)$ of functions improperly integrable over (a, b) apparently includes $R(a, b)$ as a sub-class, and the symbol $\forall$ is defined to mean " for all " but is used repeatedly to mean " for any ".

The printing and lay-out of the book are of the high standard always associated with the Cambridge University Press, though the consistent use of German letters to denote functions gives the text an unfamiliar appearance.

PHILIP HEYWOOD

ELSGOLC, L. E., *Calculus of Variations* (International series of monographs on Pure and Applied Mathematics, Vol. 19, Pergamon Press, Oxford, 1961), 178 pp., 30s.

The book begins with a preface to the " first Russian edition " but no mention is made of when and where this edition was published. The present English edition is printed in Poland; no information is given as to the identity of the translator into English.

The aim of the book is to provide students of engineering and technology with the opportunity of becoming familiar with the basic notions and standard procedures of the calculus of variations. The ground covered is the classical discussion associated with such names as Euler, Lagrange, Legendre, Jacobi, and includes a discussion of sufficient conditions based on the Weierstrassian field of extremals. The book finishes with a rather sketchy chapter on direct methods, such as Ritz's method.

The book is certainly not one for the Pure mathematician as there is very little pretence at rigour. Occasionally continuity or differentiability is mentioned, but at other times the problems are treated in a purely manipulative manner. On page 23 we find the statement " It is also assumed that the third derivative of the function $F(x, y, y')$ exists "; is " third derivative " a mistranslation of " partial derivatives of third order "? Again at the bottom of page 47 we read that the function $F(x, y, z, p, q)$ " is supposed to be differentiable ". Much more than differentiability of course is required. In any case the exact points at which existence of derivatives is required are not shown to the student.

Chapter I deals with fixed boundary problems, covering the usual ground and finishes with a rather inadequate discussion of the standard problem in parametric form. Chapter II deals with cases of variable boundary problems and contains a good account of applications to problems involving reflection and refraction. Chapter III deals with fields of extremals and in it sufficiency conditions are clearly displayed. Chapter IV deals with various problems of constrained extrema and includes a discussion of the isoperimetric problem. For the type of student for which the book is specially designed this chapter would seem to be too short and sketchy. This is true also of Chapter V which deals with direct methods. Perhaps the most useful part of the book is the large collection of examples. Besides many worked examples in the text there are problems at the end of each chapter and solutions to these are provided at the end of the book.

There is an attached errata slip giving five misprints but a first reading revealed a number of undetected errors which are either typographical or errors in translation.

R. P. GILLESPIE