the variation of the value of a game as function of its matrix.

The first four papers, by Goldman and Tucker, culminate in a *Theory of linear programming*, preceded (also logically) by an examination of the structure of polyhedral convex cones under set inclusion, by variants of the reviewer's theorems on the resolution of a polyhedral convex set into the sum of a polyhedron and a polyhedral cone and on systems related by matrix transposition, and by Tucker's opening paper on *Dual systems of homogeneous linear relations*, which consolidates previous transposition theorems and introduces the concept of slackness, stressing the importance of equated constraints (casually appearing in Stiemke, Math. Ann. vol. 76, p. 342; cf. also Miller, Amer. Math. Monthly vol. 17, p. 137; Černikov, Mat. Sb. N.S. vol. 38 (80), pp. 506–507).

As might be expected from the editors of Annals Studies 24 and 28, the value of this representative cross-section of recent research in the field is enhanced by careful revision, pleasant appearance, a clear and instructive résumé of the individual papers in the preface to the study, and an extensive and up-to-date bibliography.

THEODORE S. MOTZKIN

Einführung in die Geometrie der Waben. By W. Blaschke. (Elemente der Mathematik vom höheren Standpunkt aus, Band IV) Birkhäuser Verlag, Basel and Stuttgart, 1955. 108 pp. SFr 15.25.

This monograph contains four chapters. Chapter I deals with 3-honeycombs $\mathfrak{W}$ of curves in a Euclidean plane E_2, called 3-webs of curves in *Geometrie der Gewebe* (Springer, Berlin, 1938) by the author and G. Bol. For a $\mathfrak{W}$ three Pfaffian forms are introduced, and the connection γ and the curvature k are derived by exterior differentiation. It is proved that a necessary and sufficient condition for $\mathfrak{W}$ to be a hexagonal honeycomb is that k vanishes identically. Furthermore k is expressed in terms of a honeycomb function W. There are also obtained a complete system of invariants and a canonical expansion of the function W, from which G. Thomsen's geometric interpretation of the curvature k is deduced. Rotations and conformal mappings of honeycombs are studied by means of complex Pfaffian forms.

Chapter II is devoted to 4-honeycombs $\mathfrak{W}$ of surfaces in a three-dimensional Euclidean space E_3. As in Chapter I for a $\mathfrak{W}$ the author introduces four Pfaffian forms and obtains the connection γ, the curvatures a_1, a_2, a_3, a complete system of invariants and a canonical expansion of a honeycomb function W. It is proved that a necessary and sufficient condition for a $\mathfrak{W}$ to be an octahedral honeycomb is that a_1, a_2 and a_3 vanish identically. Hexagonal honeycombs of surfaces and octahedral and hexagonal honeycombs of planes are also discussed.

In the last two chapters n-honeycombs of curves in a plane E_2 and in a space E_3 are studied for different values of n. At the end of Chapter II and Chapter III there are listed a few problems, some of which are referred to current papers.

C. C. HSIUNG

Darstellungen von Gruppen, mit Berücksichtigung der Bedürfnisse der modernen Physik. By H. Boerner (Die Grundlehren der mathematischen Wissenschaften, vol. 74) Berlin-Göttingen-Heidelberg, Springer-Verlag, 1955. 11+287 pp. DM 36.60.

This book is concerned with the representation theory of finite groups and of the classical Lie groups, with the exception of the symplectic group. The literature on the classical groups has not been noted for its lucidity up to now. This book does a great deal to clarify matters and to render the theory more accessible. This is due largely to the tangibility and explicitness with which the author treats things. For example, the necessary parts of the Lie theory are dealt with in a very neat and concrete way so that it would be possible for a person unfamiliar with it to obtain a good insight into how it works. On the other hand, some more classical matters such as the Wedderburn theorems and Maschke's theorem are treated in a very conservative manner—lots of idempotents and matrices—which possibly is not in accord with the highest aesthetic ideals. The first chapter is devoted to elementary linear algebra and the next two develop the general representation theory of finite groups and linear Lie groups. Lie algebras and group integration are introduced and the character relations for compact Lie groups are obtained. Throughout the whole book the ground field is assumed to be of characteristic zero and, for the most part, algebraically closed. There is an extensive and detailed account of the representation theory of the symmetric group which is certainly one of the most complete available. The rest of the book deals with the classical groups. Generally speaking, the treatment is as purely algebraic as possible; comparatively little use is made of group integration. The representations of the full linear group are obtained as in Weyl's book (*The Classical Groups*, Princeton, 1936). In this connection there is one elementary point which the author does not make sufficiently clear. It is shown that the semigroup of all square matrices of degree n induces the full algebra of bisymmetric transformations on the space of tensors of given rank. However it is