155. Buchin Su: *Descriptive collineations in spaces of K-spreads.*

The author studies descriptive collineations in a space of K-spreads as a generalization of projective collineations in the general geometry of paths. After the equations expressing the conditions for an infinitesimal descriptive collineation which the space of Douglas may admit are derived, the notion of the Lie derivative is utilized in reducing the number of the integrability conditions of these equations. The group property of descriptive collineations is established. (Received December 19, 1946.)

Statistics and Probability

156. P. L. Hsu and H. E. Robbins: *Complete convergence and the law of large numbers.*

A sequence $\{X_n\}$ of random variables is said to converge to 0 *completely* if for every $\epsilon>0$, $\lim_{n\to\infty}[P(|X_n|>\epsilon)+P(|X_{n+1}|>\epsilon)+\cdots]=0$. Let $\{Y_n\}$ be a sequence of independent random variables with the same distribution function $F(y)=P(Y_n\leqq y)$ and such that $\int_{-\infty}^{\infty}ydF(y)=0$, $\int_{-\infty}^{\infty}y^2dF(y)<\infty$. It is proved that the sequence $\{X_n\}=\{n^{-1}(Y_1+\cdots+Y_n)\}$ converges to 0 completely. A partial converse of this theorem is given, and the relation between complete convergence and convergence with probability 1 is clarified. (Received January 18, 1947.)

Topology

157. C. H. Dowker: *An imbedding theorem for paracompact metric spaces.*

A space is called paracompact if every covering by open sets has a neighborhood-finite refinement. A Banach space in which every finite-dimensional linear subspace is Euclidean is called a general Euclidean space or a non-separable Hilbert space or a unitary Banach space. It is shown that a metrizable space is paracompact if and only if it is homeomorphic to a subset of a unitary Banach space. (Received January 31, 1947.)

158. Nathan Jacobson: *On the theory of primitive rings.*

In a previous paper a ring $\mathfrak{A}$ has been called *primitive* if it contains a maximal right ideal $\mathfrak{J}$ whose quotient $(\mathfrak{J}:\mathfrak{A})=0$. Here $(\mathfrak{J}:\mathfrak{A})$ is the totality of elements $b\in\mathfrak{A}$ such that $\mathfrak{A}b\subseteq\mathfrak{J}$. An extrinsic characterization of these rings is that $\mathfrak{A}$ is isomorphic to an irreducible ring of endomorphisms. In this paper the author studies the one-sided ideals in primitive rings and defines certain topologies in $\mathfrak{A}$ by using these ideals. Particular attention is given to the primitive rings that contain minimal ideals. For these, the structure theories given previously for simple rings by the author and by Dieudonné are generalized. (Received December 12, 1946.)

159. Everett Pitcher: *Čech homology invariants of continuous maps.*

The effect of a continuous map on the Čech homology (or cohomology) groups under assumptions appropriate to the theory is stated in terms of exact homomorphism sequences. This is done with the aid of new homology invariants of maps, namely homology groups of the Čech type based on chains of the nerve of the domain which vanish and homology groups based on chains of the nerve of the range which are images. The former are analogous to invariants already introduced by the writer (Bull. Amer. Math. Soc. Abstract 46-5-216) for simplicial maps. The whole development is the geometric extension of the algebraic treatment of homomorphisms of