for the finite case by Löwenheim (Math. Ann. vol. 79 (1919) pp. 223–236). (Received June 2, 1950.)

449t. Oscar Goldman: *On the theory of algebraic surfaces.*

Algebraic foundations for a theory of algebraic surfaces without singular points are developed. The considerations are essentially limited to that part of the subject which has direct bearing on the so-called Riemann-Roch Theorem. For the purpose of providing an algebraic proof of this theorem, the theory of double differentials is developed in some detail, enabling one to avoid the necessity of considering the adjoint surfaces. A proof of the birational invariance of the entire theory is included. (Received July 6, 1950.)

450t. B. W. Neumann: *Embedding nonassociative rings in division rings.*

Rings are here understood nonassociative, that is, with associativity of multiplication omitted from the usual ring postulates. Necessary and sufficient condition for a ring to be embeddable in a division ring (no matter whether one-sided or two-sided division be required) is that every nonzero element generate additively a cycle of the same order; this order, if finite, is a prime. The same condition is equivalent with embeddability in an algebra (of possibly infinite rank) over a field. Necessary and sufficient condition for a ring to be embeddable in a ring with *unique* division (on one side or on both sides) is that it possess no zero divisors. A one-sided or two-sided neutral element can be adjoined, and an obviously necessary condition is also sufficient to ensure that such adjunction does not disturb the uniqueness of division. Analogous results hold when multiplication is commutative ($xy=yx$ for all x, y), anticommutative ($xy=-yx$), or idempotent ($xx=x$). The method consists in the adjunction, as freely as possible, of single left quotients, and so forth, together with the usual transfinite building-up process. The author believes the results may be known already, but has been unable to find any references. (Received July 17, 1950.)

Analysis

451t. J. G. Herriot: *The polarization of a lens.*

Consider a conductor placed in an electrostatic field uniform at infinity and having a given direction there. The intensity of the disturbance produced by the conductor may be measured by a quantity called the polarization in the given direction. (See M. Schiffer and G. Szegö, Trans. Amer. Math. Soc. vol. 67 (1949) pp. 130–205.) The mean polarization P_m is the average of the polarizations in any three mutually orthogonal directions. Let V denote volume and C electrostatic capacity. For the bowl (limiting case of lens) the author showed earlier (see Bull. Amer. Math. Soc. Abstract 54-11-470) that $P_m \geqq (8\pi/3)C^3$. It is now shown that $P_m \geqq 4\pi C^3$ for the bowl. The inequality $P_m + V \geqq 4\pi C^3$ previously proven for a lens with dielectric angle $\pi/2$ and for two tangent spheres is now established for the symmetric lens. (Received July 20, 1950.)

Topology

452t. A. D. Wallace: *An isomorphism theorem.*

For the Alexander-Kolmogoroff cohomology groups (arbitrary coefficient group) the following is shown to hold: Let $t:(X, A)\rightarrow(Y, B)$ be the map which takes A onto the point B and maps $X-A$ topologically onto $Y-B$. Then $t^*:H^p(Y, B)\rightarrow H^p(X, A)$ is an isomorphism onto if either (i) X is fully normal and A is closed or (ii) X is locally compact Hausdorff, A is closed, and $F(A)$ is compact. This result (which seems to have been first stated by H. Cartan) seems not to be known in this generality except for the Čech groups based on finite open coverings. It is a consequence of suitable extension and reduction theorems valid under conditions analogous to (i) or (ii). In the proofs of these (under (ii)) use is made of a result of J. W. Keesee which follows from corresponding results using hypotheses of type (i). It is easily seen (and probably known) that other excision theorems are equivalent to this one. (Received July 10, 1950.)