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Schafer, R. D.
Structure of genetic algebras.
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The results of this paper consist of generalisations of results obtained by Etherington on certain nonassociative algebras occurring in the symbolism of genetics. The author defines a genetic algebra as follows. Let A be a commutative algebra over a field F with a homomorphism $x \to \omega(x)$ onto F. Then $\omega(x)$ is termed the weight of x. Let $T = \alpha I + F(R_{x_1}, R_{x_2}, \cdots)$ be an element of the transformation algebra of A. If the coefficients of the characteristic polynomial $|I - T|$ of T, in so far as they depend on the elements x_i, depend only on the weights $\omega(x_i)$, then A is a genetic algebra. The author shows that genetic algebras occupy a position intermediate between train algebras [Etherington, Proc. Roy. Soc. Edinburgh **59,** 242–258 (1939); MR0000597 (1,99e)] and commutative special train algebras [Etherington, loc. cit.; Quart. J. Math., Oxford Ser. **12,** 1–8 (1941); MR0005111 (3,102f)]. Further, the duplicate of a genetic algebra [Etherington, Proc. Edinburgh Math. Soc. (2) **6,** 222–230 (1941); MR0005113 (3,103b)] is also a genetic algebra. Next, the author shows that the kernel of the homomorphism $x \to \omega(x)$ is the radical of A and is nilpotent. Finally genetic algebras which are also Jordan algebras are considered, the results obtained being somewhat sharper than the above. *D. Rees*