ON FUNCTIONAL EQUATIONS RELATED TO DERIVATIONS AND BICIRCULAR PROJECTIONS

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Abstract. In this paper we investigate some functional equations on standard operator algebras and semiprime rings. We prove, for example, the following result, which is related to a classical result of Chernoff. Let $X$ be a real or complex Banach space, let $\mathcal{L}(X)$ be the algebra of all bounded linear operators on $X$ and let $\mathcal{A}(X) \subset \mathcal{L}(X)$ be a standard operator algebra. Suppose there exists a linear mapping $D : \mathcal{A}(X) \rightarrow \mathcal{L}(X)$ satisfying the relation $D(A^n) = D(A)A^{n-1} + AD(A^{n-2})A + A^{n-1}D(A)$ for all $A \in \mathcal{A}(X)$, where $n > 2$ is some fixed integer. In this case $D$ is of the form $D(A) = [A, B]$ for all $A \in \mathcal{A}(X)$ and some fixed $B \in \mathcal{L}(X)$. Some functional equations related to bicircular projections are also investigated.


Keywords and phrases: Ring, ring with involution, prime ring, semiprime ring, Banach space, Hilbert space, standard operator algebra, derivation, inner derivation, Jordan derivation, Jordan triple derivation, bicircular projection.

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