Title: Posner's first theorem and related identities for semiprime rings

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We generalize Posner's first theorem and related identities to arbitrary semiprime rings. For instance, Posner's first theorem for semiprime rings is proved as follows: Let R be a semiprime ring with extended centroid C, and let $\delta, D \colon R \to R$ be derivations. Then δD is also a derivation if and only if there exist orthogonal idempotents $e_1, e_2, e_3 \in C$, $e_1 + e_2 + e_3 = 1$, and $\lambda \in C$ such that $e_1 D = 0$, $e_2 \delta = 0$ and $e_3(\delta - \lambda D) = 0$, where $e_2 R$ is 2-torsion free and $2e_3 R = 0$.

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