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Anticommutativity of symmetric and skew-symmetric elements in group rings

Let RG denote the group ring of a group G over a commutative associative ring with identity R. An involution $g \mapsto g^*$ on G extends linearly to an involution of RG and we shall consider involutions on RG of this type. The symmetric elements of RG under one such involution form a subring of RG if and only if they commute. Necessary and sufficient conditions for this to happen have been studied by several authors. We shall consider an analogous problem: when does $(RG)^-$, the set of skew-symmetric elements, form a subring? It is easy to see that this happens if and only if skew symmetrics anticommute, so we shall discuss this question. The set $(RG)^-$ is closed under the Lie product $[\alpha, \beta] = \alpha\beta - \beta\alpha$ and the problem of deciding when this product is trivial has also received a lot of attention. We shall discuss an analogous question: when is the Jordan product trivial in the set of symmetric elements; i.e., when do the symmetrics anticommute?

Joint work with Edgar Goodaire.