

## A $9 \times 9$ matrix algebra (not) satisfying certain identities

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ABSTRACT. We exhibit a  $9 \times 9$  matrix algebra satisfying the polynomial identity  $[[x, y], [u, v]] = 0$ , but none of the stronger identities  $[x, y][u, v] = 0$  and  $[[x, y], z] = 0$ . Then we exhibit a Cayley-Hamilton trace identity for  $2 \times 2$  matrices with entries in a ring  $R$  satisfying  $[[x, y], [u, v]] = 0$  and  $\frac{1}{2} \in R$ .

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