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Problem. Suppose that S is a commutative ring with identity 1. A subring R of S is called *unital* if $1 \in R$. For the purposes of this problem, call S *special* if S has the following properties:

(a) S has a proper unital subring,
(b) there exists a prime ideal of S which is not maximal, and
(c) if R is any proper unital subring of S, then every prime ideal of R is maximal.

Prove the existence of a special ring or show that no such ring exists.