Locally recurrent functions, denstity topologies and algebrability

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A real function f defined on a closed interval $I \subset \mathbb{R}$ is called *locally recurrent on* I, if for every $x \in I$ and $\varepsilon > 0$ there exists $y \neq x$, $|y - x| < \varepsilon$ such that $f(x) = f(y)$.

We will show that there exist continuum-generated linear algebras in the class of continuous locally recurrent almost everywhere differentiable functions, as well as in the class of continuous locally recurrent functions that are simultaneously continuous with respect to density and I-density topologies.

Both classes of functions mentioned above are of first category in the space of continuous functions. Both proofs are therefore constructive.