Problem 17 Let $p > 0$ be a prime.
Let $P \in \text{Ob } C(F_pC_p{-}\text{-Mod})$ be the projective resolution of the trivial $F_pC_p$-module as found in Problem 9.(1).
Let $X := (P)$, so that $X$ has $P$ as its only tuple entry.
Let $A := \text{Hom}_{F_pC_p}(X)$ be the regular differential graded category, i.e. differential graded algebra over $\mathbb{Z} = \mathbb{Z} \times [1,1] \times [2,2]$.
Recall from Problem 9 and Problem 14 that we have calculated the $\mathbb{Z}$-graded module $HA$, i.e. that we know $F_p$-linear generators for its graded pieces.
Find a minimal $A_3$-structure $(\bar{m}_1, \bar{m}_2, \bar{m}_3)$ on $HA$ and a quasiisomorphism $(q_1, q_2, q_3) : HA \to A$ of $A_3$-algebras.

Problem 18 Suppose $R$ to be a field.
Let $Z$ be a grading category. Let $n \in [1, \infty]$. Let $A$ be a unital $A_n$-algebra over $Z$.
Consider the shift-graded linear residue class map $ZA \overset{\rho}{\to} HA$ of degree 0.
Show that there exists a shift graded linear map $ZA \overset{\sigma}{\leftarrow} HA$ of degree 0 such that $\sigma \rho = \text{id}_{HA}$ and such that $(1_X \rho) \sigma = 1_X$ for $X \in \text{Ob}(Z)$.

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