Exercises 4

(1a) Show that the projective resolution $X_\bullet$ of an object X is uniquely determined up to chain homotopy equivalence.

(1b) For F a right exact functor $F : \mathcal{A} \to \mathcal{B}$ of abelian cats show that the objects $L_iF(X)$ are uniquely defined up to isomorphism.

(2) Consider the ring $\mathbb{Z}/4$ of integers mod 4, and the $\mathbb{Z}/4$-module $\mathbb{Z}/2$, with action $n.m = nm \bmod 2$.

- Describe an explicit projective resolution of $\mathbb{Z}/2$. in fact, Free!

(3) Show that if R, S are non-trivial rings, then R is <u>projective</u> but not <u>free</u> as an $R \times S$-module.