

Homework 1 for 509A, Homological algebra
due Friday, April 7, 2017

Throughout this homework, R will be a associative ring with 1.

Problem 1. Show that the category of chain complexes over a ring R is an abelian category.

Problem 2. Show that a chain map $f : C_{\bullet} \rightarrow D_{\bullet}$ induces a well-defined map on homology: $H_n(f) : H_n(C_{\bullet}) \rightarrow H_n(D_{\bullet})$.

Problem 3. Exercise 1.4.5 in [1]. 1.4.5.4 is optional but highly recommended to ponder over.

Problem 4. Show that a chain complex C_{\bullet} is split exact if and only if it is null homotopic.

REFERENCES

- [1] C. Weibel, An introduction to homological algebra, Cambridge University Press, 1995