Homework 6: Due Tuesday, April 15

(1) Read Eisenbud §A3.1-A3.3. (I encourage you to read more! I won’t have time to cover most of the material in Appendix §A3, but it includes a fantastic treatment of homotopies of complexes, derived functors, and more!)

(2) Given two complexes $F_{\bullet}$ and $G_{\bullet}$, we can define a new complex by

$$
(F \otimes G)_i := \bigoplus_{p+q=i} F_p \otimes G_q
$$

with boundary

$$
\partial(f \otimes g) = \partial f \otimes g + (-1)^p f \otimes \partial g.
$$

Fix a (commutative, Noetherian) ring $R$ and $x_1, x_2, x_3 \in R$. Confirm that, with this definition, there exists a natural isomorphism (up to signs):

$$
K(x_1, x_2) \otimes K(x_3) \cong K(x_1, x_2, x_3).
$$

(3) Eisenbud, Exercise 17.1.
(4) Eisenbud, Exercise 17.2.
(5) Eisenbud, Exercise 17.3.
(6) Eisenbud, Exercise 20.16.