Math 7120 – Homework 4 – Due: February 23, 2022

Practice problems:

Problem 1. Prove that the functor $\hom_R(\_, D)$ is left-exact.

Test prep:

Problem 2. Give an example of each of the following:

(1) a projective module that is not free
(2) an injective $\mathbb{Z}$-module
(3) a non-injective $\mathbb{Z}$-module

Type solutions to the following problems in LaTeX, and email the tex and PDF files to me at `dbernstein1@tulane.edu` by 10am on the indicated date. Please title them as [lastname].tex and [lastname].pdf. When preparing your solutions, you must follow the rules as laid out in the course syllabus.

Graded Problems:

Problem 3. Let R be a ring with a 1. Follow the prompts and hints laid out in Problems 15 and 16 in Section 10.5 to prove that that every R-module is contained in an injective R-module. You can cite any of the theorems in the book, aside from the implication $3 \implies 2$ of Proposition 34. Then, do exercise 17 in section 10.5.