Math 5120, Spring 2018, Homework and Announcements

Due Wednesday January 24:
Section 9.1: 2, 5
Section 9.2: 3, 5, 6

Due Wednesday January 31:
Section 9.3: 4
Section 9.4: 1, 2, 6bc, 14

Due Friday February 9:
Section 9.5: 2bc
Section 13.1: 1, 3
Section 13.2: 3, 4, 7, 8, 14

Due Friday February 16:
Section 13.4: 2, 3
Section 13.5: 3, 4, 5


Due Wednesday February 28:
Section 13.6: 3, 6
Section 14.1: 1, 3, 4

Due Wednesday March 7:
Section 14.2: 1, 3, 4, 10, 16
Section 14.3: 2
Section 14.4: 1, 2

Due Wednesday March 21:
Section 14.5: 4, 5
Section 10.1: 3, 4, 9, 10, 11
Due Wednesday March 28:
Section 10.2: 1, 7, 9
Section 10.3: 1, 6, 7, 9, 13

Exam 2: Monday April 9, covers Sections 13.6, 14.1 - 14.5 and Sections 10.1 - 10.3.

Due Wednesday April 18:
Section 10.4: 2, 3, 4, 7, and the following two problems:

1) Prove that $\mathbb{Q} \otimes \mathbb{Z} \mathbb{Q}$ is isomorphic (as $\mathbb{Z}$-modules) to $\mathbb{Q}$. [Do this exercise by first constructing a middle linear map from $\mathbb{Q} \times \mathbb{Q}$ to $\mathbb{Q}$.]

2) Let $A$ be an abelian group. Use addition to denote the binary operation in $A$. Let $m$ be a fixed positive integer and let $B = \{ma \mid a \in A\}$. ($B$ is a subgroup of $A$.) Show $A \otimes \mathbb{Z} \mathbb{Z}/m \mathbb{Z}$ is isomorphic (as $\mathbb{Z}$-modules) to $A/B$. [Do this exercise by first constructing a middle linear map from $A \times \mathbb{Z}/m \mathbb{Z}$ to $A/B$.]

Due Wednesday April 25:
Section 18.1: 2, 6bcd, 7, 8 and the following problem:

Let $G$ be the group $\mathbb{Z}_2 \times \mathbb{Z}_2$ and let $R = CG$ denote the group ring of $G$ over $\mathbb{C}$. Note $R$, being a ring, is an $R$-module. Find a 1-dimensional $R$-submodule $U$ of $R$ and then use the proof of Maschke’s Theorem to find an $R$-submodule $W$ of $R$ such that $R = U \oplus W$ as $R$-modules.

Due Wednesday May 9:
Take home portion of final exam. (See handout.)