Math 30820 Honors Algebra 4
Homework 4

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Due Wednesday, 2/19/2020

Do 5.

Throughout this problem set R is an **integral domain**, unless otherwise specified.

1. Let M be a noetherian module over a ring R. Color the elements of M electorally (red or blue). We say that a submodule A of M is monochromatic if all the elements of A are colored in the same color. Show that there exist maximal monochromatic submodules of M. Bonus: For how many of the 256 colorings of the $\mathbb{F}_2$-module $\mathbb{F}_2^3$ is there a unique maximal monochromatic submodule? Feel free to use a computer for this one.

2. Artin 14.9.1 on page 440.

3. Artin 14.9.5 on page 440.

4. Artin 14.M.3 on page 440.

5. Artin 14.M.7 on page 441.

6. Artin 15.2.2 on page 472.

7. Artin 15.3.2 on page 472.

8. Artin 15.3.3 on page 472.

9. Artin 15.4.1 on page 473.