

Math 202 — Homework #2

Due Apr 12, 2011

The page and problem numbers below refer to the third edition of Dummit and Foote's "Abstract Algebra."

- Do the problems you didn't finish from last week.
- Sec 10.4, #3, 7, 8, 11, 12, 19, 20, 24, 26, 27.
- Show that unlike direct sums, tensor products do not in general commute with direct products using these two examples:

1. Compare

$$\mathbf{Q} \otimes_{\mathbf{Z}} \prod_{i=1}^{\infty} \mathbf{Z} \quad \text{and} \quad \prod_{i=1}^{\infty} (\mathbf{Q} \otimes_{\mathbf{Z}} \mathbf{Z}).$$

How would you describe the first as a (proper) subset of the second?

2. Show that

$$\mathbf{Q} \otimes_{\mathbf{Z}} \prod_{i=1}^{\infty} (\mathbf{Z}/2^i \mathbf{Z}) \neq 0 \quad \text{whereas} \quad \prod_{i=1}^{\infty} (\mathbf{Q} \otimes_{\mathbf{Z}} (\mathbf{Z}/2^i \mathbf{Z})) = 0.$$

(Hint: #8(d).)

- Sec 10.5, #6, 10, 11, 12, 16, 17, 27, 28.