  

Math 4510: Abstract Algebra II

Mondays and Wednesdays, 2pm-3:20pm

Dr. Elizabeth Drellich

So you have taken or are taking Abstract Algebra I (3510) and know what a group is, for example: $\mathbb{Z}_{17}$.

- You can add, for example $10 + 14 = 24 = 7$ in your group.
- You have inverses, $-(10) = 7$ since $10 + 7 = 17 = 0$ in your group.
- You have an identity element, $0 + x = x$.
- You might even know that the only subgroup of $\mathbb{Z}_{17}$ is the trivial group, since the order of any subgroup must divide the order, 17 of your group.

But wait! There's more! Your group has other stuff happening!

- Can you multiply in $\mathbb{Z}_{17}$? After all, these are numbers, does $5 \times 5 = 25 = 8$?
- Do you have a multiplicative identity? Does $1 \times y = y$ for all elements y?
- Does every non-zero element have a multiplicative inverse? For example

$$3 \times 6 = 18 = 1.$$

The answers to all these questions, for $\mathbb{Z}_{17}$, are YES! This means your group is a ring, with unity, and in fact it is a field.

But you know what else? Our friend $\mathbb{Z}_{17}$ can multiply with elements in $\mathbb{Z}_{17} \oplus \mathbb{Z}_{17}$:

$$4 \times (5, 9) = (20, 36) = (3, 2)$$

We say $\mathbb{Z}_{17} \oplus \mathbb{Z}_{17}$ is a $\mathbb{Z}_{17}$-module.

If you have taken Abstract Algebra (Math 3510) and want to learn more about groups, subgroups, rings, fields, ideals, and modules, then Abstract Algebra II (Math 4510) is for you!

We will be using the same textbook, and picking up where the 3510 classes leave off this semester.