

Math 818, Fall 2024, Dr. Honigs
Homework 1
Due Fri. Sept. 20

Instructions: You are encouraged to work in groups, but your final written solutions must be in your own words. At the top of your paper, write down the names of anyone you have worked with on the problem set.

Complete the following textbook exercises and questions.

Exercises:

- In Gathmann’s “Commutative Algebra” (CA): **1.11, 3.5, 3.11, 3.16, 7.22**
- In Gathmann’s “Algebraic Geometry” (AG): **1.20, 1.22**

In (CA) 1.11, show this directly, do not use Nullstellensatz.

In (CA) 3.16, use the definition of “irreducible” from p. 19 of CA: it cannot be written as a product of two non-units.

In (AG) 1.20, you may assume we are working over the field \mathbb{C} .

Questions:

1. Describe all the maximal ideals of $\mathbb{C}[x]$ and $\mathbb{R}[x]$ and prove you have found them. Describe all of the varieties in $\mathbb{A}_{\mathbb{C}}^1$ and $\mathbb{A}_{\mathbb{R}}^1$. Then, do Exercise 0.15 (a),(b),(d) in CA.