MATH 8253: ALGEBRAIC GEOMETRY
HOMEWORK 2
DUE WEDNESDAY, OCTOBER 5, 2:17 P.M.

INSTRUCTOR: SASHA VORONOV

1. Review your course notes and read Gathmann's *Chapter 3: The Sheaf of Regular Functions* and *Chapter 4: Morphisms* through *Section* 4.14. Do Exercises 3.12, 3.20–3.21, 3.23, 4.12–4.13.

Hints: **3.12 (a)**: For the sufficient condition, mimic the proof of 3.11 by finding $V(p)$ for a prime $p \in A(X)$ strictly between Y and X. Then find another element in $I(Y) \setminus I(X)$ to get a second element of $A(X)$ to work with.

3.12 (b): You may find the following supply of non-UFD domains helpful: $k[x, y, z, w]/(xy - zw)$, $k[x, y, z]/(xy - z^2)$, $k[x, y, z]/(x(z + 1) - yz)$.

2. Have you formed a study group? It is not too late! See the link on forming a study group in the syllabus.

3. Do not hesitate to send me an email at `voronov@umn.edu`, should you have a question or need a hint. I am also holding office hours Monday, Tuesday, and Thursday. Times have been adjusted as compared to the initial syllabus — check the class home page.

4. Submit the homework by the start of our Wednesday, October 5, class meeting, i.e., by 2:17 p.m. If you can submit it electronically to Gradescope at
`https://www.gradescope.com/courses/445177`,
it would be greatly appreciated. If you do not have a Gradescope account, you may sign up for one using your umn.edu address or access it through Canvas.