

Algebra: homework #5*

Due 3 October 2022

Collaboration and use of external sources are permitted, but must be fully acknowledged and cited. You will get most out of the problems if you tackle them on your own. Collaboration may involve only discussion; all the writing must be done individually.

Homework must be submitted in L^AT_EX via e-mail. I want both the L^AT_EX file and the resulting PDF. The files must be of the form `andrewid_algebra_hwnum.tex` and `andrewid_algebra_hwnum.pdf` respectively. Pictures do not have to be typeset; a legible photograph of a hand-drawn picture is acceptable.

1. Let F be a field.
 - (a) Show that $a_0 + a_1x + a_2x^2 + \cdots \in F[[x]]$ is a unit if and only if $a_0 \neq 0$.
 - (b) Show that the ring of Laurent series over F is a field.
2. Let G be a finite group, and let I be an ideal in a commutative ring R , and define $R' = R/I$. Show that $R'G$ is isomorphic to a quotient of RG by a certain ideal I' . What is I' ?

*This homework is from <http://www.borisbukh.org/Algebra22/hw5.pdf>.