

Math 567: Abstract Algebra I

Homework 1

10 points total. Due Friday, Jan 28 by 11:10 am in class.

Problems

1. (3 points - 1 point per object) Write down the definitions of group, ring, and vector space, and give an example of each (use different examples than the examples we gave in class). This should be a non-collaborative problem - make your own examples!
2. (2 points) Write down the definition of an \mathbb{R} -algebra and explain why $\mathbb{R}[x]$ is one.
3. (1 point each) Artin problems 1.1, 1.2, 1.4(a), 1.4(b), 2.1

Bonus Problem

(+1 point, a just-for-fun review of group theory:) Watch the following Youtube video on how to solve a 1x1 Rubix cube: <https://www.youtube.com/watch?v=73VNfiUKnbQ> and consider the transformation $RUR'U'$ defined in the video. Label the sides of the cube 1 through 6 and describe the rotations R and U as permutations of the faces in cycle notation, and compute the composition $RUR'U'$ in cycle notation. Check that it has the effect described in the video.