

Math 6320, Assignment 0

Not to be submitted.

1. Get yourself a ruler and a compass and figure out how to do the following:
 - (a) Construct the perpendicular bisector of a line; i.e. the line perpendicular to the given one and passing through its midpoint.
 - (b) Projection of a point onto a line.
 - (c) Given two points, say O (for the origin) and A, construct a point B such that the line OB and OA are of the same length, and are perpendicular to each other; in other words, an orthonormal basis for the plane (assume OA has length one).
 - (d) Given a line and a point not on it, construct a line passing through the point and parallel to the given line.
 - (e) Given line segments of length a and b , construct line segments of length $a \pm b$, ab , and $1/a$.

At the end, it follows that all rational numbers can be constructed (using only a ruler and a compass) from 1.

2. Refresh (or learn) basic linear algebra: vector spaces over fields; linear (in)dependence; bases; row and column rank; solving linear equations, both homogeneous and inhomogeneous.