

Math 130
Homework 5 – Due October 11, 2016
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1. Think about your independent project. Do enough research to help you choose a topic. (nothing to hand in)
2. Summarise Ellenberg's argument (see the course website) of how the Fano plane (that is, the projective plane with 7 points) helps you buy lottery tickets (where the lottery has 7 numbers).
3. Using the axioms P1-4 for a projective plane (see Hartshorne, exercise 6.3), prove that every point is contained in (at least) 3 different lines.
4. Compare the axioms P1-4 to Stillwell's axioms in Section 5.3 (page 94). Is one axiomatic approach to projective planes equivalent to the other? That is, given P1-4, can you prove Stillwell's 1-3, and vice versa?
5. Explain how to produce a perspective drawing of a floor tiled with regular hexagons, using straightedge alone (see problems 5.2.1 and 5.2.2 in Stillwell).