This list is intended as the start of a study guide. There is no guarantee that because a topic is listed here that it will be on the midterm, nor is there a guarantee that every problem on the midterm is represented in the list below.

The second midterm will focus on projective space and the ideas learned in Chapter 5 and the three worksheets "Drawing Tiles in Perspective", "Projective Transformations of the Line", and "Tiny Projective Planes". You will be required to do straightedge (and possibly compass) constructions in the course of the exam. If you have your own compass and ruler, please bring them.

Some specific topics you should study:

- How did the perspective tiling drawing technique work? You should be able to use this technique to draw " projectively" using a straightedge alone.
- Know the axioms for a projective plane.
- Know the various equivalent models we described: a plane with a line at infinity, a sphere with antipodal points identified, a half sphere with the boundary glued together backwards, and $\mathbb{RP}^2$, the set of lines through the origin in $\mathbb{R}^3$. Be able to explain how these models are related. Given a sketch in one model, be able to identify it in another model.
- What is duality? Give examples of theorems that demonstrate duality. Given a statement, be able to write down its dual statement.
- Know the model $\mathbb{RP}^2$ well. What are the points? What are the lines? What are homogeneous coordinates for points? For lines? How can you tell using coordinates if a point is on a line or vice-versa? Be able to demonstrate duality using homogeneous coordinates.
- What is the relationship between projectivities and fractional linear transformations?
- What are inhomogeneous coordinates in $\mathbb{RP}^1$?
- Given two different inhomogeneous coordinates systems z and w in $\mathbb{RP}^1$, how are z and w related?
- What is the cross ratio of four points in $\mathbb{RP}^1$?
- What is important about the cross ratio?
- Given four lines through the origin in $\mathbb{R}^2$, be able to compute their cross ratio.
- Know the Fundamental Theorem of Projective Geometry.
- Study the worksheets on tiny projective planes. Be able identify a drawing of a tiny projective plane.