Final Projects, Math 711
To be presented during the last few classes of the term.

The assignment is to present one of the following results (or another one that we decide on through consultation) in class, about a half hour, together with a write-up.

1. Develop the theory of modules over a ring R and prove the positive primitive quantifier elimination. Useful material can be found in the book on the model theory of modules by Mike Prest or in articles by Martin Ziegler.

2. Prove the Tarski-Seidenberg result that the theory of the reals (in the right language) has quantifier elimination.

3. Develop infinitary first order logic and prove the Scott isomorphism theorem and compute the Hanf number. Both of these results are classical. The book by Barwise, Admissible sets and structures contains everything needed and much more.

4. Present the results in the section of Marker's book on independence results in arithmetic and in particular the Paris-Harrington theorem.

5. Use the model theory of the real field to give a resolution of Hilbert's 17^{th} problem. This is also in Marker's book.

6. Marker also includes a proof of Morley's result about the number of countable models of a countable theory - it is still the best result regarding Vaught's conjecture.

7. Give a presentation of the Erdos-Rado graph and say something about zero-one laws for finite graphs.

8. Continuous model theory is a generalization of the first order model theory we have been studying. The ultraproduct for metric spaces plays a role in its development. Give an introductory presentation on this logic with an eye to a particular example (talk to me if you want to do this project).