

**MATH 692 SPRING 2024
MINI-PAPER TOPICS.**

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Here is a list of possible topics for mini-papers. You are welcome to suggest others, but topics should be cleared with me in advance. If you choose to write a paper on one of these, add “**Taken—RL**”, with “RL” replaced by your initials, next to it (in the git repository).

Last updated April 3, 2024. This list of topics will expand over time.

- (1) Use the classification of surfaces to prove that the mapping class group acts transitively on the space of smooth, non-separating simple closed curves in Σ .
- (2) Prove that the mapping class τ_γ of a Dehn twist along a curve γ depends only on the isotopy class of γ .
- (3) Prove Smale’s Theorem, that $Diff^+(I^2, \partial I^2)$ is contractible (giving a complete statements of results used along the way, like the Poincaré-Bendixson Theorem, but not re-proving them).
- (4) Prove that $Diff^+(I^2, \partial I^2) \cong Diff^+(D^2, \partial D^2)$.
- (5) Prove Macbeath’s Theorem.
- (6) Prove that every triangulated, orientable 3-manifold admits a Heegaard splitting.
- (7) Any problem marked with a star on Homework 1.

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