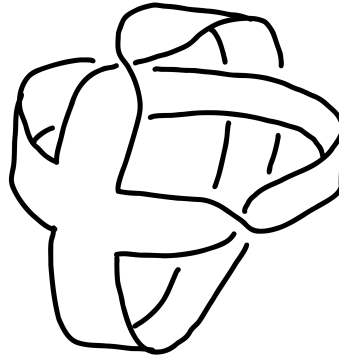Algebraic Topology Prelim Exam
Jan 11, 2024, 9:00–11:00

Solve all three problems.

Problem 1. Let X be the space pictured; it consists of two Möbius bands identified "across each other".

(a) What surface is obtained by capping off its boundary components with disks?
(b) Draw the orientation cover, indicating the action of the deck group.

Problem 2. Let X be the 2-torus T with a 3-cell attached. Compute $H_*(X)$. (In particular, the answer is independent of the attaching map.)

Problem 3. Let $X = S^2$, and let Y be the wedge sum of X with another 2-sphere. Show that Y retracts to X, but does not deformation-retract to it.