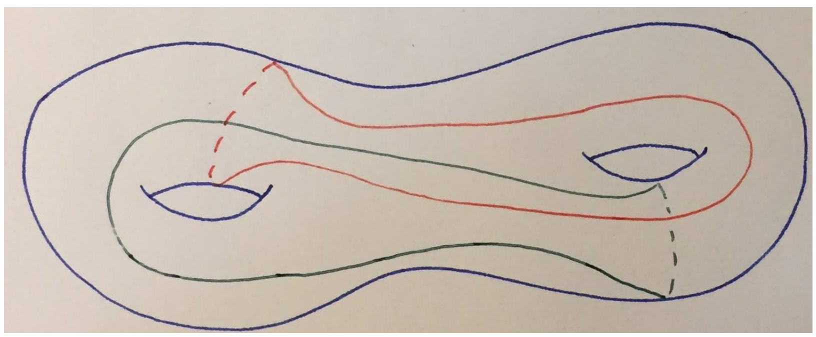
Exercise Set #2

Exercise 1: Compute $\pi_1(L(p,q))$.

Exercise 2: Show that $L(p,q) \cong L(p,q')$ if $qq' \equiv 1 (\mathsf{mod}\, p)$.

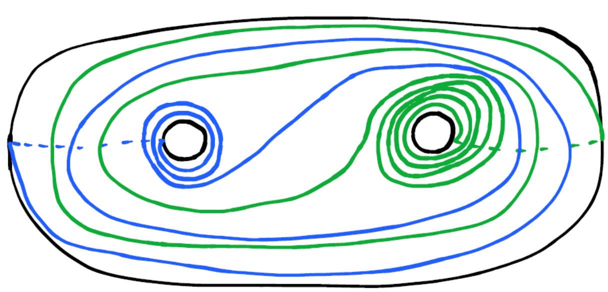
Exercise 3: Find a Heegaard diagram of $\mathbf{RP}^3$.

Exercise 4: What manifold is described by the following Heegaard diagram?



Exercise 5: Let F be a closed orientable surface of genus g, and $\alpha_1, \dots, \alpha_g$ a collection of disjoint simple closed curves on F. Prove that the homology classes of $[\alpha_1], \dots, [\alpha_g] \in H_1(F)$ are linearly independent if and only if the open surface $F \backslash \{\alpha_1, \dots, \alpha_g\}$ is connected.

Exercise 6: Compute π_1 of the "random example" pictured below.



Exercise 7: For each positive integer g, find a 3-manifold of Heegaard genus g.