

# Topology and Groups

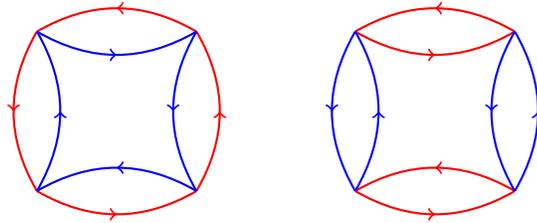
Week 9, Thursday

## 1 Preparation

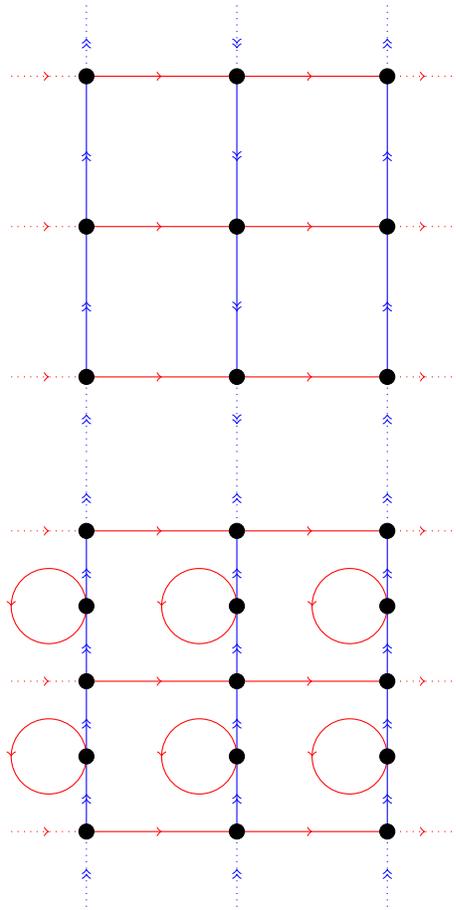
- 8.04 (Deck group).

## 2 Classwork

1. For each of the following covering spaces  $p: Y \rightarrow X$ , give the monodromy permutations associated to  $a$  and to  $b$ , find a generating set for the subgroup  $p_*\pi_1(Y)$ , and identify the deck group:



2. The following are infinite covering spaces of  $S^1 \vee S^1$ ; in each case, the diagram is supposed to extend doubly-periodically to the whole plane. Which of these covering spaces is normal? Find the deck group in each case.



3. Below are two 6-fold covers of  $X$ . In each case, write down a deck transformation sending the vertex 1 to the vertex 5 (it is enough to say where it sends each oriented edge and each vertex). In each case, find the order of this deck transformation in the deck group. Are the covers isomorphic?

