MATH534B, Exam 2
April 9, 2019

1. Describe deck transformations of the covering $\mathbb{C} \setminus \{-1\} \to \mathbb{C} \setminus \{-1\}$ given by $z \mapsto z^2 + 2z$.

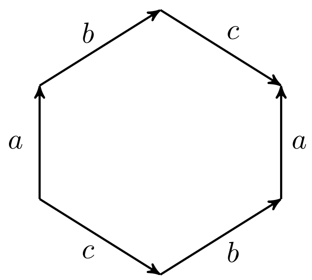
2. Consider the subspace $X \subset \mathbb{R}^2$ given by $X = \{y = 0\} \cup \{x \in \mathbb{Z}\}$. Define a $\mathbb{Z}$-action on X by $(x, y) \mapsto (x + m, y)$, where $m \in \mathbb{Z}$.

   (a) Describe the quotient space $X/\mathbb{Z}$.

   (b) Prove that the quotient map $X \to X/\mathbb{Z}$ is a universal covering.

   (c) Compute the fundamental group of $X/\mathbb{Z}$.

3. Consider the space X obtained from a hexagon by identifying its sides as shown in the figure:



Compute the simplicial homology of X with coefficients in $\mathbb{Z}$.