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:

\begin{center}
\begin{tikzpicture}
\draw (0,0) -- (1,0) -- (1,1) -- (0,1) -- (-1,1) -- (-1,0) -- cycle;
\draw (0,0) -- (0,1) node[midway, above] {$a$};
\draw (1,0) -- (1,1) node[midway, right] {$b$};
\draw (0,1) -- (1,1) node[midway, right] {$c$};
\draw (-1,1) -- (-1,0) node[midway, below] {$a$};
\draw (-1,0) -- (-1,1) node[midway, below] {$b$};
\draw (-1,1) -- (0,1) node[midway, above] {$c$};
\end{tikzpicture}
\end{center}

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