Homework 4
Due Wednesday, Feb. 24th
Answers should be written in LaTeX.

Assume that
$$p\colon E \to B$$
is a covering space and E is simply connected and locally path connected. Let $b_0 \in B$ and $e_0 \in p^{-1}(b_0) \subset E$ be basepoints.

1. Let $e_1 \in p^{-1}(b_0)$. Show that that there is a lift of the map of pairs
$$p\colon (E, e_1) \to (B, b_0).$$
That is show that there exists a map
$$p_1\colon (E, e_1) \to (E, e_0)$$
with $p \circ p_1 = p$ and $p_1(e_1) = e_0$.
2. Show that p_1 is a homeomorphism.
3. Let $G \subset \mathsf{homeo}(E)$ the set of all such homeomorphisms (as we let e_1 vary of all points in $p^{-1}(b_0)$). Show that G is a subgroup.
4. Show that the action of G on E is a deck action.
5. Show that the quotient space is homeomorphic to B.