1. Let us pick a homeomorphism $\phi : \Delta^1 \to I$. For a based space $(X, x)$, let us define $H : \pi_1(X, x) \to H_1(X, \{x\})$ by $H([f]) = [f \circ \phi]$.

(i) Prove that $H([f])$ is independent of choice of representative $f : (I, \partial I) \to (X, x)$.

(ii) Prove that $H$ defines a natural transformation of functors from the category whose objects are based spaces and morphisms are based maps, to the category whose objects are groups and whose morphisms are group homomorphisms.