Hand in exercise May 6, 2010:

Exercise 0.1. *Let M be the Moebius band and let A be the boundary circle of M.*

(1) *Let also S^1 be the unit circle (viewed inside the complex plane). Show that, after identifying $\pi(S^1, 1)$ with the group $(\mathbb{Z}, +)$, the group homomorphism f_* induced by $f : S^1 \longrightarrow S^1$, $f(z) = z^n$ becomes the map $m_2 : \mathbb{Z} \longrightarrow \mathbb{Z}$, $m_2(n) = 2n$.*

(2) *Show that if $A \subset X$ is a subset of a topological space and $r : X \longrightarrow A$ is a retraction of A in X then*

$$r_* : \pi(X, a) \longrightarrow \pi(A, a)$$

is surjective for all $a \in A$.

(3) *Prove that there is no retraction of M into its boundary circle A.*