

HOMEWORK #3

1. (a) Let X be a connected CW complex. Pick basepoints $x_0 \in X$ and $y_0 \in S^1$. Let $[X, S^1]$ be the set of basepoint-preserving maps from X to S^1 , up to basepoint-preserving homotopy. Show that $[X, S^1]$ can be identified with $H^1(X; \mathbb{Z})$.
(b) Why can't we similarly identify $H^1(X; \mathbb{Z}_2)$ with $[X, \mathbb{R}P^2]$, the set of homotopy classes of (basepoint-preserving) maps from X to the real projective plane?
2. Hatcher 3.2.1
3. Show that there is no degree one map from a genus 2 surface to a genus 3 surface.
4. Hatcher 3.2.7
5. Hatcher 3.2.8