Math 6220 Introduction to Topology 2
Homework Set 3

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Problem 1: Let X be a deformation retract of Y. Prove that then $H_n(X) = H_n(Y)$ for all $n \in \mathbb{N}$.

Problem 2: Prove that the chain homotopies $P_n^X : S_n(X) \to S_n(X \times I)$ are natural, i.e. that

$$(f \times I)_* \circ P_n^X = P_n^Y \circ f_*$$

for all continuous $f : X \to Y$.

Problem 3: Determine $H_1(D^2, S^1)$ and $H_1(S^1, S^0)$, where D^2 denotes the closed unit ball in $\mathbb{R}^2$.