For these exercises, we take for granted that $H_0(S^1 \times S^1) = \mathbb{Z}, H_1(S^1 \times S^1) = \mathbb{Z}^2, H_2(S^1 \times S^1) = \mathbb{Z}, H_k(S^1 \times S^1) = 0$ otherwise. The proof of these will be presented later in class.

1. Let $B \subset A \subset X$ be topological spaces and $G$ an Abelian group. Prove that $0 \to C_k(A, B; G) \to C_k(X, B; G) \to C_k(X, A; G) \to 0$ is an exact sequence of chain complexes.

2. Hatcher exercise 2.1.17.