

## HOMEWORK #1

1. Prove the Splitting Lemma (stated in section 2.2 of Hatcher, p. 147).
2. Let  $G$  be an abelian group. Prove the following:

(a) If

$$0 \rightarrow A \rightarrow B \rightarrow C \rightarrow 0 \tag{1}$$

is exact then

$$\mathrm{Hom}(A, G) \leftarrow \mathrm{Hom}(B, G) \leftarrow \mathrm{Hom}(C, G) \leftarrow 0$$

is exact.

(b) If (1) is split exact, then

$$0 \leftarrow \mathrm{Hom}(A, G) \leftarrow \mathrm{Hom}(B, G) \leftarrow \mathrm{Hom}(C, G) \leftarrow 0$$

is split exact.

3. Section 3.1, Problem 1.
4. Section 3.1, Problem 5.
5. Section 3.1, Problem 6(a).