1. Let \( \{A_k\}, k \in \mathbb{N} \), be a sequence of \( \mathbb{Z} \)-modules, each isomorphic to \( \mathbb{Z} \), with homomorphisms from \( A_{k-1} \) to \( A_k \) given by multiplication by \( k \). Identify, with proof, the direct limit of \( \{A_k\} \).

2. Prove directly that the kernel of the homomorphism “constant sheaf \( \rightarrow \) skyscraper sheaf” described in [Warner, §5.11] is not fine. (You may do it simply for the skyscraper sheaf \( S_p \) with just one nonzero stalk. Note that it would also solve [Warner, Exercise 17 on p. 217])

3. [Warner, Exercise 9 on p. 216].

4. [Warner, Exercise 10 on p. 216].

5. Prove the exactness of sequence (2) in [Warner, Proposition 5.17] at either \( H^q(C^*) \) or \( H^q(E^*) \) (this is a part of [Warner, Exercise 13 on p. 216]).