

**Math 527 - Homotopy Theory**  
**Spring 2013**  
**Homework 14, Lecture 4/29**

**Problem 3.** Compute the following rational cohomology algebras.

a.  $H^*(K(\mathbb{Z}, 3); \mathbb{Q})$

b.  $H^*(K(\mathbb{Z}, 4); \mathbb{Q})$

Hint: Consider the cohomology Serre spectral sequence of the path loop fibration

$$K(\mathbb{Z}, n-1) \rightarrow PK(\mathbb{Z}, n) \rightarrow K(\mathbb{Z}, n)$$

and recall that  $H^*(K(\mathbb{Z}, 2); \mathbb{Q}) \cong \mathbb{Q}[\iota_2]$  is a polynomial algebra on a class  $\iota_2 \in H^2(K(\mathbb{Z}, 2); \mathbb{Q})$  which is the image in  $\mathbb{Q}$ -coefficients of the fundamental class.