Algebraic topology, Fall 2013

Homework 10, due Wednesday, November 20

Exercises 1, 2, 5, 8ac, 13 on pages 204-206. Exercise 1 on page 280.

1. Suppose that X has integral homology groups

$$H_0(X) = \mathbb{Z}, \quad H_1(X) = \mathbb{Z}/4 \oplus \mathbb{Z}/2, \quad H_3(X) = \mathbb{Z}/72 \oplus \mathbb{Z},$$

and all other groups are zero. Determine cohomology groups of X with coefficients in $\mathbb{Z}$, $\mathbb{Q}$, $\mathbb{R}$, $\mathbb{Z}/8$, $\mathbb{Z}/2$, $\mathbb{Z}/3$, and $\mathbb{Z}/5$.

2. Compute ext groups $\mathrm{Ext}(\mathbb{Z}/4, \mathbb{Z}/12)$, $\mathrm{Ext}(\mathbb{Z}/10 \oplus \mathbb{Z}, \mathbb{Z})$, $\mathrm{Ext}(\mathbb{Z}/3, \mathbb{R})$, $\mathrm{Ext}(\mathbb{Z}/9, \mathbb{Z}/9)$, $\mathrm{Ext}(\mathbb{Z}/2, \mathbb{Q}/\mathbb{Z})$.