

Math 752 - Hopf algebras
Worksheet 4
Spring 2017

1. Redo the calculation from the end of Wednesday's class. That is, use the reduced cobar complex to compute $\text{Ext}_{E(x_n)}^*$ and describe the ring structure.

2. (Polynomial algebra)
 - (a) Start by writing down a length 1 free resolution of k over $k[x]$. Use this to compute $\text{Ext}_{k[x]}^*$.
 - (b) Try to redo this calculation using the reduced cobar complex instead.

3. (Divided powers) Let $\mathcal{H} = \Gamma_{\mathbb{F}_2}(x)$ be a divided power algebra on a class in degree 1.
 - (a) Compute $\text{Ext}_{\Gamma(x)}^1$. (Hint: do we know the primitives in the dual?)
 - (b) Convince yourself that $\text{Ext}_{\Gamma(x)}^*$ is polynomial with generators in $\text{Ext}_{\Gamma(x)}^1$.

4. Double check the formulas given for the differentials in the reduced cobar complex: that $d^0 = 0$ and $d^1 = \bar{\Delta}$.