

This assignment is due in class on Monday, March 31, 2014.

Question #1. Can you interpret the co-product  $\square: \mathcal{A}(1) \rightarrow \mathcal{A}(1) \otimes \mathcal{A}(1)$  in the Lie algebra world?

Hint: You will need to look at more than one Lie algebra at the same time.

Question #2. Show that the degree 2 anomaly 2-form  $\alpha_2$  in the anomaly 2-form  $\alpha$  vanishes.

Question #3. A very simple question, yet it is crucial for understanding why physicists will often say:

"Feynman diagrams for Fermions are the same as for Bosons, just add a factor of  $(-1)^{\#\text{Fermion loops}}$ ."

show that for  $\sigma \in S_k$ ,

$$(-1)^\sigma = (-1)^k \cdot (-1)^{\#\text{cycles of } \sigma}$$