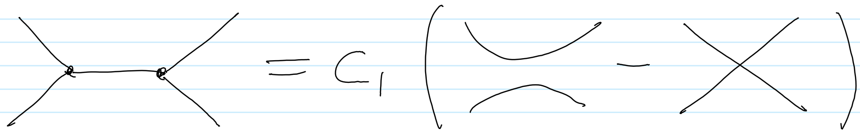
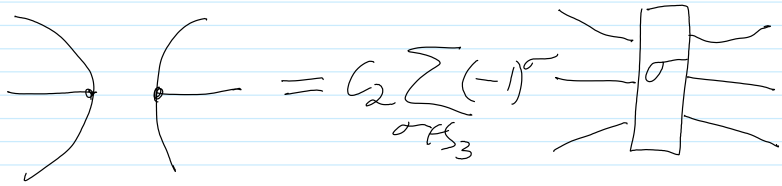
14-1350-AKT Homework Assignment 7

March-03-14 8:37 AM

This assignment is due in class on Monday, March 17, 2014.

Question #1. Prove that $so(3)$ "$sl(2)$" weight systems $W_{so(3),R}$ satisfy the following additional identities, no matter which representation R is chosen:

A. 

B. 

In these two identities all edges are internal (the skeleton is not involved), and the constants C_1 and C_2 depend only on the choice of the metric.

Bonus: what mean, these two, in the language of vector calculus and/or determinants?

Question #2. Explain why infra-red divergences [meaning, faces that come from clusters "at ∞"] do no harm to the diagram

$$\begin{array}{ccccccccl} \bar{\mathcal{D}}^\bullet_n: & \cdots \longrightarrow & \bar{\mathcal{D}}^m_n & \xrightarrow{d} & \bar{\mathcal{D}}^{m+1}_n & \longrightarrow \cdots & & & \text{"The graph complex"} \\ & & \downarrow I & & \downarrow I & & & & \\ \Omega^\bullet: & \cdots \longrightarrow & \Omega^m(\Gamma) & \xrightarrow{d} & \Omega^{m+1}(\Gamma) & \longrightarrow \cdots & & & \text{"Knot space cohomology"} \end{array}$$

Question #3. ~~Verify that indeed, under $D \mapsto D^g := g^{-1}Dg$ and with $D_A s = ds + As$ we get $D_A^g = D_{g^{-1}Ag + g^{-1}dg}$, as in http://drorbn.net/bbs/show?shot=AKT14-140307-101950.jpg .~~

cancelled — identical to Q3 of HW6.