

Diagrammatics and Skew Relations

1] Show that the category of finite dimensional vector spaces is Pivotal. (i.e. write down ω , coev , and show they satisfy the snake lemma $N=1=U$)

◦ give graphical interpretations for the trace and transpose of a matrix.

◦ Is the category of all vector spaces pivotal? why or why not?

2] A pivotal category is called spherical if its left and right traces coincide. Show that this is equivalent to having our graphical calculus on a sphere.

3] Perhaps the most famous skew relation is the Kauffman bracket:

$$\text{X} = q^{\frac{1}{2}} \text{Y} + q^{-\frac{1}{2}} \text{Z}$$

◦ what can this assign to the unknot?

◦ We are implicitly coloring by the fundamental representation V of $SL_2\mathbb{C}$. Usually Skeins are oriented, but these ones are not. what property does this imply about V ?