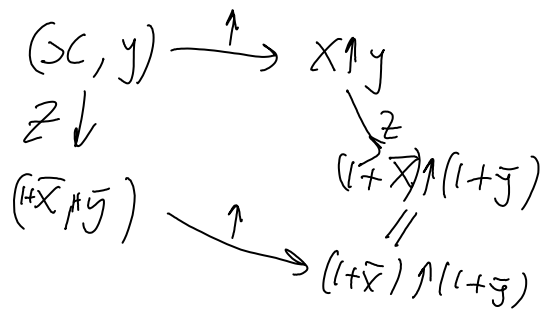


An expansion: $\begin{matrix} x & \xrightarrow{z_0} & 1+\bar{x} \\ | & \longrightarrow & | \end{matrix}$ for the generators,



Does it annihilate the quandle relation?

$$\begin{aligned}
 (x \uparrow y) \uparrow h &= (x \uparrow h) \uparrow (y \uparrow h) \\
 \downarrow & \\
 0 &= (\bar{x} \uparrow \bar{h}) \uparrow (\bar{y} \uparrow \bar{h})
 \end{aligned}$$

The only remaining term is in deg 4:

$$\begin{aligned}
 0 &= (\bar{x} \uparrow \bar{h}) \uparrow (\bar{y} \uparrow \bar{h}) \\
 &= [[\bar{x}, \bar{h}], [\bar{y}, \bar{h}]] \quad \text{fails!}
 \end{aligned}$$

- Questions
1. Is there a different candidate?
 2. Does z_0 work "mod homotopy"?
 3. Is there an alternative notion of "expansion" that does work here?
 4. Is it at all true that $FQ_n^{\text{proj}} = FL_n$?

For the last question, let $\mu: FQ_n \rightarrow FG_n$ be the obvious map given by $a \uparrow b \rightarrow b^{-1}ab$ and set

$$Z^y = \log Z^{xy} \circ \mu.$$

$$x \uparrow y \mapsto \log e^{-y} e^{xy} = x + [x, y] + \dots$$

$$1 \wedge X = 1 \quad 1 \wedge \bar{X} = |1X - 1| = 0$$