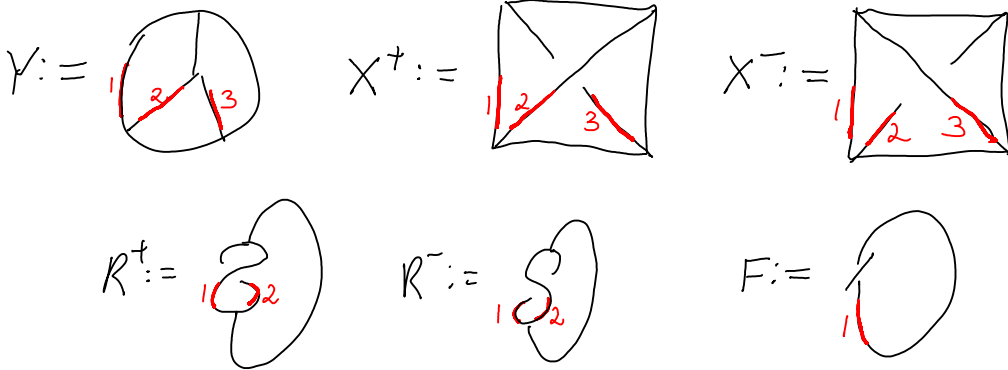


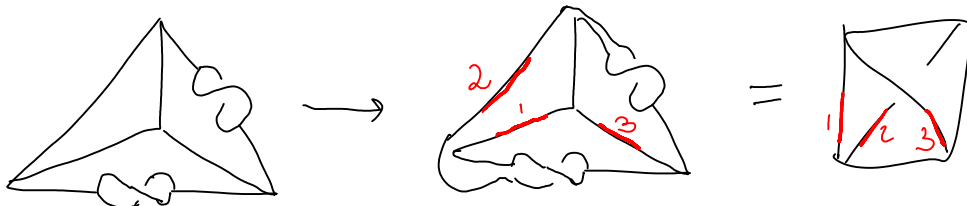
# KTG Relations

November-28-09  
11:52 AM

- An order 3 symmetry of Y.
- The anti-symmetry of X under 90 degrees rotation.
- R2
- R3
- R4+ and R4-.
- Behaviour under unzip.
- Behaviour under delete.
- Behaviour under connect sum.
- Idempotency of Y.
- Idempotency of X.
- Writing X in terms of Y and R+ and R-.
- Writing X in terms of Y and F.
- R+, R-, and F in terms of each other.

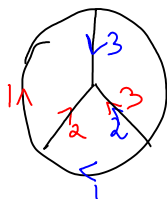


Writing X in terms of Y and  $R^\pm$ :



$$X^- = R^{12} \Phi^{213} (R^-)^{2,13} \quad \text{and} \quad X^+ = (R^-)^{12} \Phi^{213} R^{2,13}$$

An order 3 symmetry of Y:

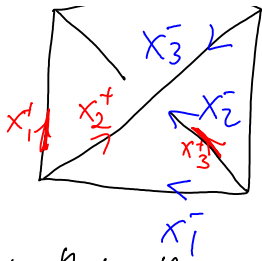


$$(Y_1, Y_2, Y_3) = (Y_1, Y_1, Y_3, Y_2, Y_3)$$

check that this is order 3:

$$\begin{aligned} (Y_1, Y_2, Y_3) &\xrightarrow{1} (Y_1, Y_1, Y_3, Y_2, Y_3) \xrightarrow{2} (Y_1, Y_1, Y_3, Y_2, Y_3) \\ &\xrightarrow{3} (Y_1, Y_1, Y_2, Y_1, Y_3, Y_2, Y_1) = (Y_1, Y_1, Y_2, Y_1, Y_3, Y_2, Y_1) \\ &= (Y_1, Y_2, Y_3) \quad \checkmark \end{aligned}$$

X & rotation by 90°:

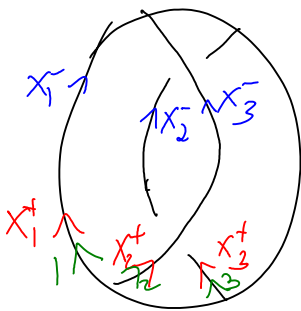


$$\& \begin{aligned} (x_1^+; x_2^+; x_3^+) &= (x_1^-; x_1^- \bar{x}_3^-; x_2^-) \\ (x_1^-; x_2^-; x_3^-) &= (x_1^+; x_1^+ \bar{x}_3^+; x_3^+) \end{aligned}$$

check that this is of order 4:

$$\begin{aligned} (x_1; x_2; x_3) &\xrightarrow{1} (x_1; x_1 \bar{x}_3; x_2) \xrightarrow{2} (x_1; x_1 \bar{x}_2; x_1 \bar{x}_3) \\ &\xrightarrow{4} (x_1; x_1 x_2 \bar{x}_1; x_1 x_3 \bar{x}_1) = (x_1; x_2; x_3) \quad \checkmark \end{aligned}$$

Reidemeister 2:



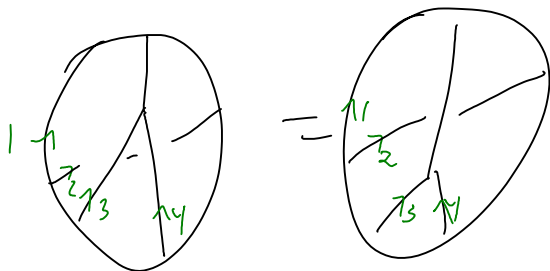
$$\begin{aligned} X^+ X^- &= 1 \quad \text{or} \\ (x_1^{+1} \underline{x_1^{+2}}; x_2^{+1} \underline{x_1^{+2}} \underline{x_3^{+2}}; x_3^{+1} \underline{x_3^{+2}}) &= (1, 1, 1) \end{aligned}$$

Reidemeister 3



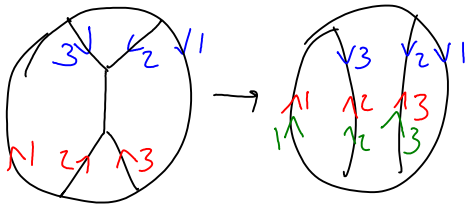
$$X^{123} X^{13,2,4} X^{13,4} = X^{12,3,4} X^{12,4} X^{14,2,3}$$

Reidemeister 4



$$X^{123} X^{13,2,4} Y^{13,4} = Y^{12,3,4} X^{1,2,3,4}$$

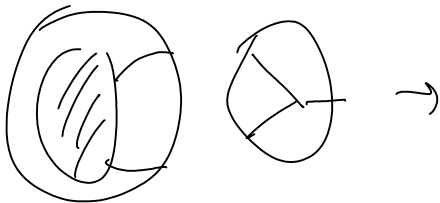
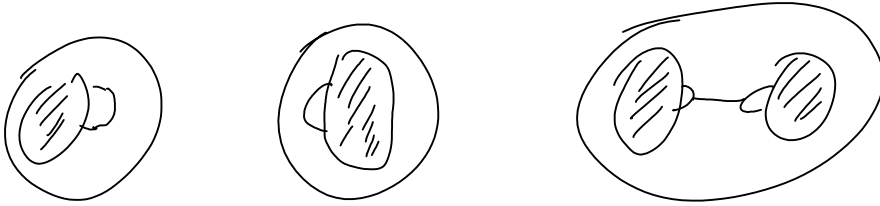
Behaviour under unzip



$$(1,1,1) = (Y_1^1 Y_1^2, Y_2^1 Y_2^2 Y_2^3, Y_3^1 Y_3^2 Y_3^3)$$

Behaviour under delete

Behaviour under connect sum:



$$\text{unzipped tet} = 1 ?$$

