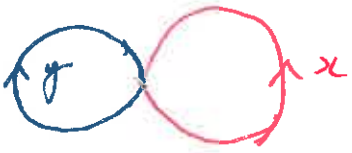
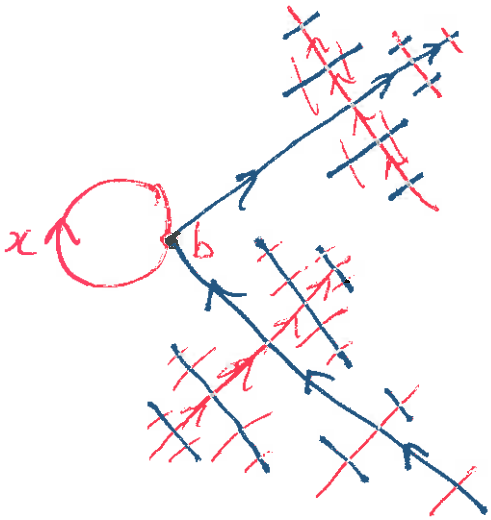
Sheet 6

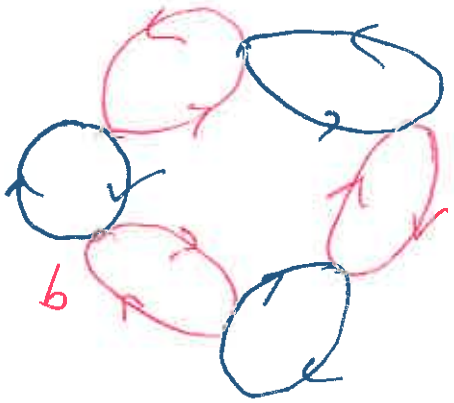
1) $X =$



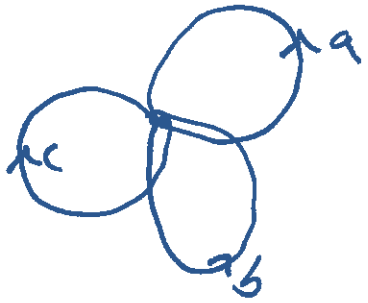


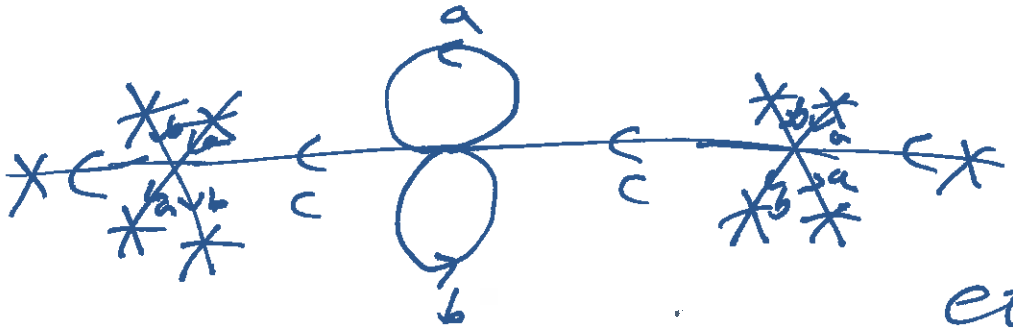
etc.

2.



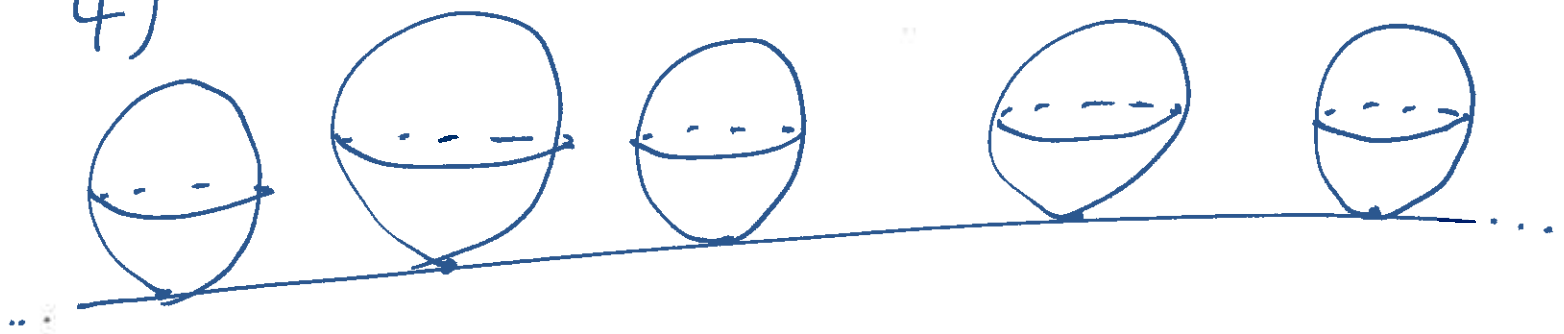
3.) $Y =$



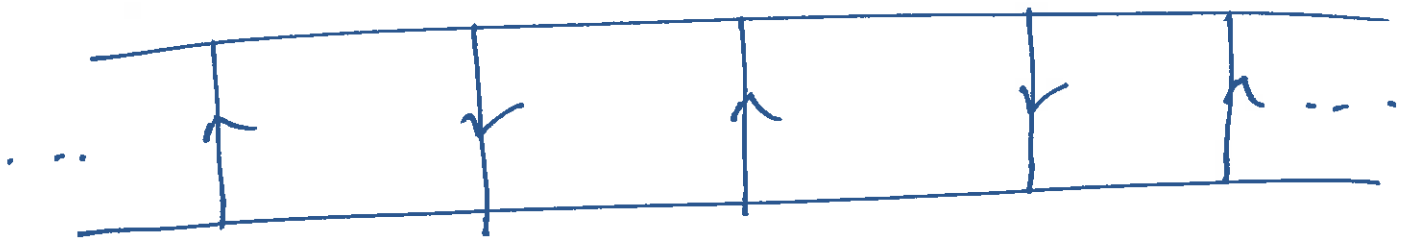


etc

4)

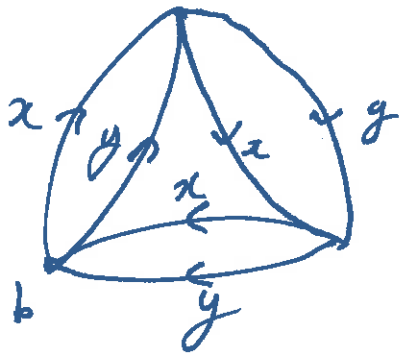


5 $M =$



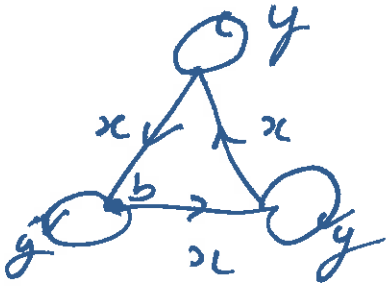
6. They are given by covers of $S^1 \vee S^1$ of degree 3 up to equivalence. The 13 different covers are drawn below.

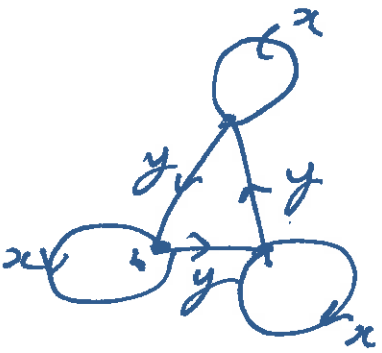
$\langle x^3, yx^{-1}, x^2y, xyx \rangle$



$S^1 \vee S^1 =$ 

$\langle x^3, x^2y^{-1}, y^{-1}x^{-1}, x^2yx^{-1} \rangle$

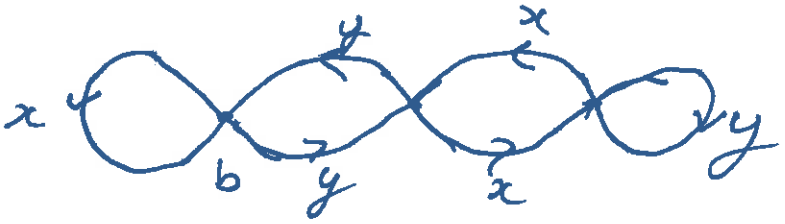




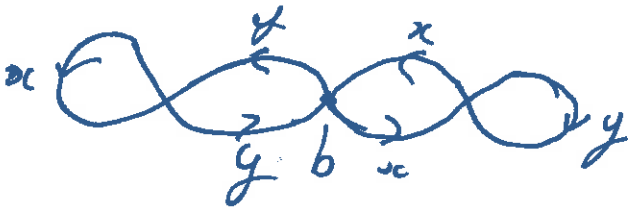
$\langle y, x^3, xyx^{-1}, x^2yx^{-2} \rangle$

$\langle x, y^3, yxy^{-1}, y^2xy^{-2} \rangle$

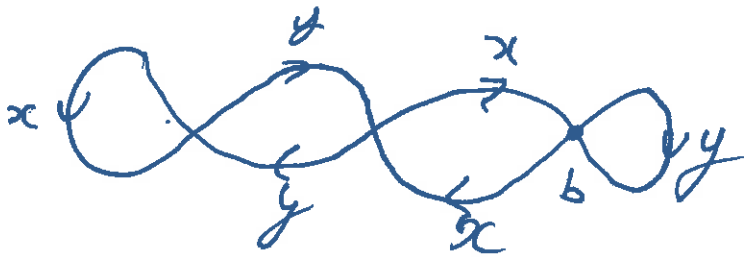
These are normal



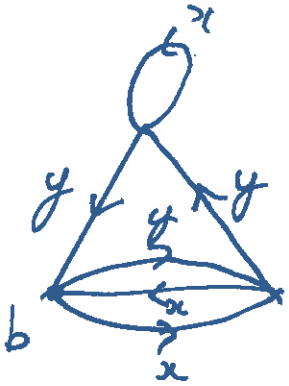
$\langle x, y^2, yxyx^{-1}y^{-1}, yx^2y^{-1} \rangle$



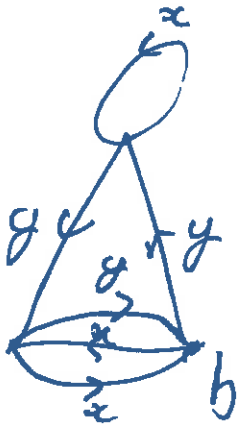
$\langle yxy^{-1}, y^2, x^2, xyx^{-1} \rangle$



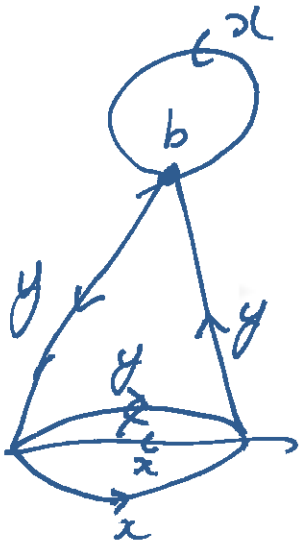
$\langle y, x^2, xyxy^{-1}x^{-1}, xy^2x^{-1} \rangle$



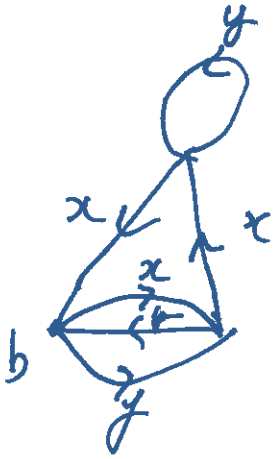
$\langle yx, yx^{-1}, y^3, y^2xy^{-2} \rangle$



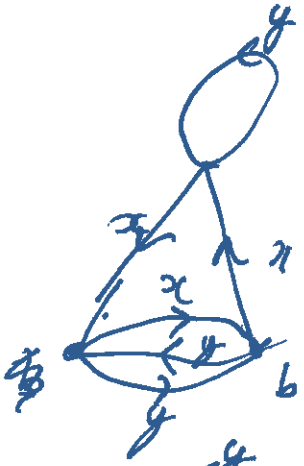
$\langle yxy^{-1}, y^3, y^2x^{-1}, y^3x \rangle$



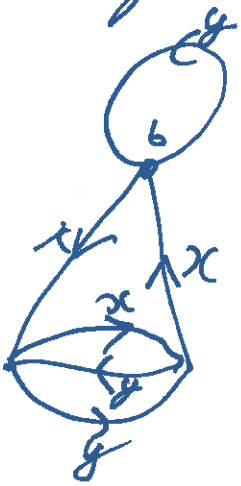
$\langle x, y^3, yxy^{-2}, y^2xy^{-1} \rangle$



$\langle xy, xy^{-1}, x^3, x^2yx^{-2} \rangle$



$\langle xyx^{-1}, x^3, x^2y^{-1}, x^2y \rangle$



$\langle y, x^3, xyx^{-2}, x^2yx^{-1} \rangle$