11\26\2007

missing due to computer problems.

r	b
r	r

= rbrr

$\cancel{g(x)}$ $\quad g * x$

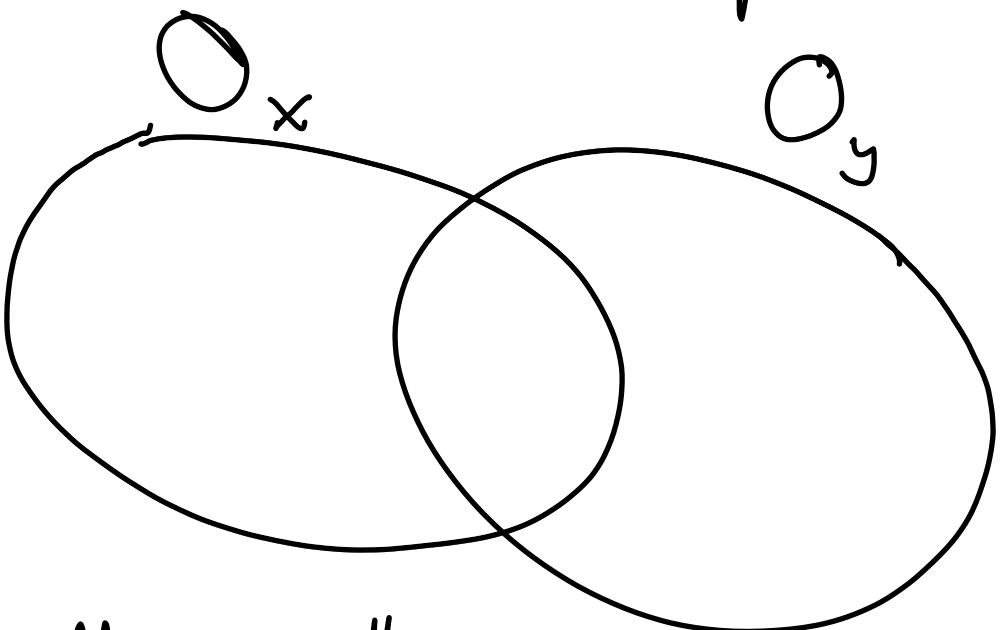
Orbit O_x of $x \in X$.

$O_x = \{ y : y = g * x \text{ for some } x \in X \}$

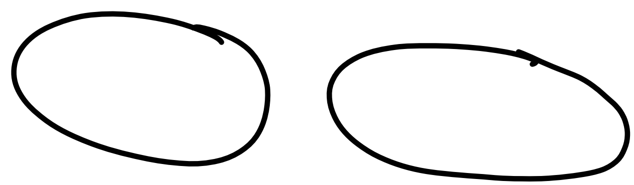
$\Rightarrow O_y = O_x$

Question: How many orbits are there

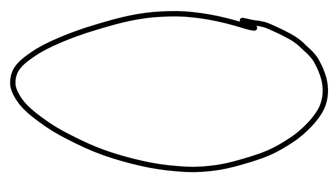
Claim: The orbits partition X.



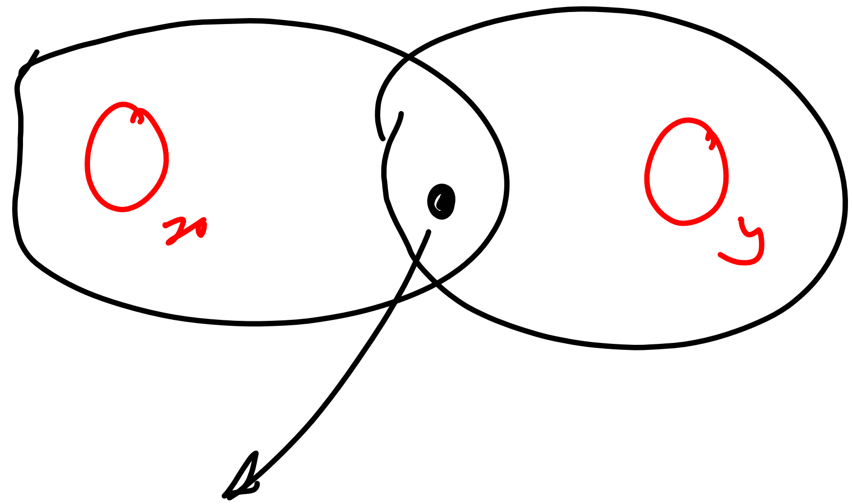
To show this is really

(1) 

or

(2) 

If 2 orbits intersect in a non-empty set then they are equal.



$$g_1 * x = g_2 * y \qquad g_1, g_2 \in G$$

$$g_1^{-1} * (g_1 * x) = g_1^{-1} * (g_2 * y)$$

$$(g_1^{-1} \circ g_1) * x = (g_1^{-1} \circ g_2) * y$$

$$x = h * y \qquad h = g_1^{-1} \circ g_2 \in G.$$

$$z \in O_x : \ z = g * x = (g \circ h) * y$$

$$\Longrightarrow z \in O_y . \qquad O_x \subseteq O_y \subseteq O_x .$$

$H \leq G$ is a <u>subgroup</u> if

(i) $e \in H$

(ii) $g_1, g_2 \in H \Rightarrow g_1 \circ g_2 \in H$

(iii) $g \in H \Rightarrow g^{-1} \in H$.

Stabiliser $S_x = \{ g : g * x = x \}$

Aim to prove $\#\text{orbits} = \dfrac{1}{|G|} \sum_{x \in X} |S_x|$.