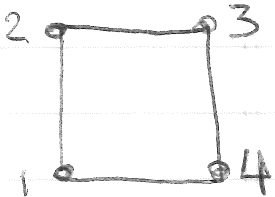# Sample computation in D_8

Suppose we want to compute $r_1 s_1$ (recall $r_1 =$ counterclockwise rotation by $90°$)

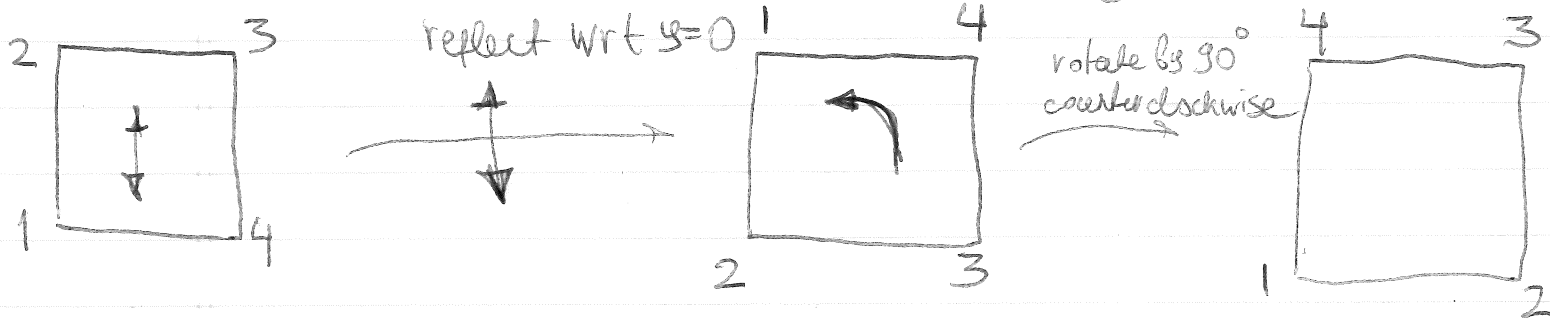$s_1 =$ reflection wrt $y=0$

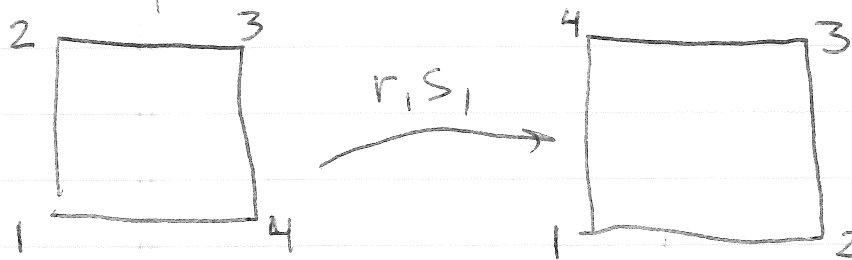Denote the vertices of the square by $1, 2, 3, 4$ (in some order), say

By definition $r_1 s_1$ means we first apply s_1 & then r_1 (the order is reversed according to the usual convention for composing two functions)
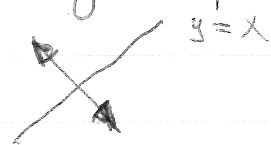
Let us see where labels move when we first apply s_1 & then r_1:

reflect wrt $y=0$

rotate by $90°$ counterclockwise

So the composite transformation $r_1 s_1$ permutes vertices as follows

$r_1 s_1$

Now we look for an element of D_8 which performs exactly this permutation of vertices — clearly it is s_2 (reflection wrt $y=x$)

$y=x$

Hence $r_1 s_1 = s_2$