Transpositions and Permutations

Transposition

If σ is a 2-cycle, it is called a transposition.

Proposition

For all $n \geq 1$, S_n is generated by transpositions.

Proof.

It suffices to generated cycles. Observe that

$$[12 \cdots m] = [1m] \cdot [12(m-2) \cdots (m-1)]$$

and use induction. $\square$

Question

Can you generate S_n by a transposition and an n-cycle?