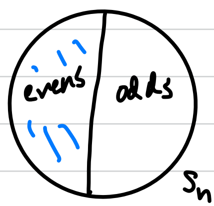
So: By our theorem, every permutation can be unambiguously referred to as even or odd depending on how it decomposes into 2-cycles.

Ex $(1234) = (14)(13)(12) = (12)(41)(24)(13)(21)$

So (1234) is an odd permutation.



Thm The set of all even permutations in S_n forms a subgroup, denoted A_n.

"alternating group"

proof: exercise.

$|S_n|$

Thm $|A_n| = \dfrac{n!}{2}$

proof: exercise. (create a bijection between even and odd permutations in S_n, so half of elements in S_n are even.)

Ex $|A_4| = \dfrac{4!}{2} = 12$ ← later, we'll see this has no subgroups of order 6.

↳ contrast with FTCG.