ZAD 1. $(\forall g \in G)\ g^2 = e \implies G$ is commutative

ZAD 3.

First of all, we showed during lecture that every permutation of n elements can be written as a finite product of cycles of form (1a). To recap this, we just need to be able to achieve any transposition (kl), cus then we can do anything

$$(kl) = (1k)(1l)(1k).$$

Then we want to show that any permutation can be written as a finite product of $(k\ k+1)$. For that we can use previous observation to show that (1 k) can be written using $(k\ k+1)$. Using induction:

$$(1\ k+1) = (1k)(k\ k+1)(1k).$$

Finally, we claim that every $(k\ k+1)$ can be written using (12) and (12...n):

$$(k\ k+1) = (12...n)(k-1\ k)(12...n)^{-1}$$

which actually boils down to

$$(k\ k+1) = (12...n)^{k-1}(12)(12...n)^{-k+1}.$$