centralizer

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Let G a group acting on itself by conjugation. Let X be a subset of G. The stabilizer of X is called the *centralizer* of X and it's the set

$$C_G(X) = \{g \in G : gxg^{-1} = x \quad \text{for all } x \in X\}$$

For any group G, $C_G(G) = Z(G)$, the center of G. Thus, any subgroup of $C_G(G)$ is an abelian subgroup of G. However, the converse is generally not true. For example, take any non-abelian group and pick any element not in the center. Then the subgroup generated by it is obviously abelian, clearly non-trivial and not contained in the center.