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length function

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Let G be a group. A **length function** on G is a function $L: G \rightarrow \mathbb{R}^+$ satisfying:

$$\begin{aligned}L(e) &= 0, \\L(g) &= L(g^{-1}), \quad \forall g \in G, \\L(g_1 g_2) &\leq L(g_1) + L(g_2), \quad \forall g_1, g_2 \in G.\end{aligned}$$