**Question 1.** *Give an example of a group $G$ and two elements $a, b$ in $G$ such that "the order" $|ab|$ does not equal "the order" $|a||b|$.*

*Solution.* Consider a group $G$, consisting of the identity $e$ and an element $g$, such that $g^2 = e$ (it is in fact isomorphic to $\mathbb{Z}_2$). Take $a = b = g$. Then $|a| = 2$, because $a \neq e$ and $a^2 = e$. Therefore, $|a||b| = 4$. Since $ab = g^2 = e$, we have $|ab| = 1$. Thus, $|ab| \neq |a||b|$. $\qquad\square$