9. Give an example of a group G and elements a and b of G with $(ab)^3 \neq a^3 b^3$. Explain.

Let $a = \sigma$ and $b = \rho$ in $G = D_3$.

Observe that $(ab)^3 = (\sigma \rho)^3 = \sigma \rho$

But $a^3 b^3 = \sigma^3 \rho^3 = \sigma$ ← we are not equal.

10. The group D_4 has three distinct subgroups of order 4. List the elements of each of these subgroups. (I do not need to see any details.)

$\{id, \rho, \rho^2, \rho^3\}$

$\{id, \rho^2, \sigma \rho^2, \sigma\}$

$\{id, \rho^2, \sigma\rho, \sigma\rho^3\}$