Exercise 1. Consider a set S with a binary operation $*$, that is, for each $a, b \in S$, $a * b \in S$. Assume that $(a * b) * a = b$ for all $a, b \in S$. Prove that $a * (b * a) = b$ for all $a, b \in S$. [Putnam 2001, A1].

Exercise 2. Let S be a non-empty set with an associative operation that is left and right cancellative ($xy = xz$ implies $y = z$ and $yx = zx$ implies $y = z$). Assume that for every a in S the set $\{a^n : n = 1, 2, 3, \ldots\}$ is finite. Must S be a group? [Putnam 1989, B2]