Problem 0(a)

Theorem 1 ($|A| = 2 \implies |\mathcal{P}(A)| = 4$)**.** *The power set of a set with two elements has four elements.*

Proof. Let A be a set with two aribtrary elements which we will address as A_0 and A_1. Constructing the power set of A, the definition of the power set gives $\mathcal{P}(A)$ equal to $\{\emptyset, \{A_0\}, \{A_1\}, \{A_0, A_1\}\}$. We see that there are four elements in $\mathcal{P}(A)$. ■