Problem 0(a)

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

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