Problem 0(a)

Theorem 1 ($|A| = 3 \implies |\mathcal{P}(A)| = 8$)**.** *The power set of a set with three elements has eight elements.*

Proof. Let A be a set with three aribtrary elements which we will address as A_0, A_1, and A_2. Constructing the power set of A, the definition of the power set gives $\mathcal{P}(A)$ equal to:

$$\{\emptyset, \{A_0\}, \{A_1\}, \{A_2\}, \{A_0, A_1\}, \{A_0, A_2\}, \{A_1, A_2\}, \{A_0, A_1, A_2\}\}$$

We see that there are eight elements in $\mathcal{P}(A)$. ■