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CMPS 102
Homework 3

Problem 1:
(a) Show by induction that $(H_k)^2 = 2^k I_k$, where I_k is the identity matrix of dimension 2^k.
Proof by Induction on k:

Base Case: $k = 0$. Then $H_0^2 = [1][1] = [1] = 2^0 \cdot I_0$.

Induction Step: Let $n \geq 0$ and $0 \leq n < k$. Suppose that $(H_n)^2 = 2^n I_n$, where I_n is the identity matrix of dimension 2^n.