Challenge Problem 1

CPSC 489/689 Quantum Algorithms

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The hidden subgroup problem can be informally stated as follows:

> **The Hidden Subgroup Problem:** Let $f\colon G \to X$ be a black box function from a finite group G to a finite set X such that
>
> $$f(x) = f(y) \quad \text{if and only if} \quad y^{-1}x \in H,$$
>
> where H is some initially unknown subgroup of G. Your task is to find a generating set S of H.

Find an *efficient* quantum algorithm, which solves the Hidden subgroup problem for all finite groups G. Alternatively, show that such an algorithm cannot exist.

I offer a **Challenges in Quantum Computing Award**, worth US$ 256, for the first correct solution to this problem.

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