MAT 399/599/597, CS 393/593 - Fall 2026

Quantum Algorithms

Course Project - Grover's Algorithm

Due Date: Thursday, Dec 3

Overview:

The goal of this project is to implement Grover's Algorithm for unstructured search in Qiskit. This requires implementation of gates U_f, U_1, U_s, and the Grover iterator G.

The code should specify a size n and a function f which takes inputs as bit-strings of length n and gives outputs 0 or 1. The default case ($M = 1$) is that there is only one one string s which has $f(s) = 1$. It is fine to hard code n and f in your main python script.

The main script should run and output the string s with probability $1 - \frac{1}{2^n}$.

Deliverables:

- all code files
- pdf output of gates and circuits
- README.txt explaining usage, parameters, inputs, limits
- AI attribution, prompts, and output

AI usage:

- AI use is encouraged but must follow these guidelines
- any significant help from AI should be documented
- prompts and responses should be included
- mild use and discussion should receive attribution

Extra Credit:

For extra credit there are several options:

- sonification
- unknown number of marked elements M