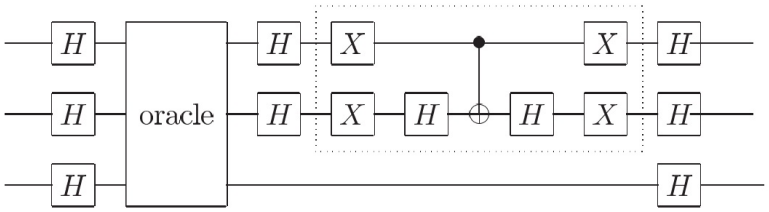
Computação Quântica
Problema 1 - 2 April 2020 - 9 April 2020

Consider the following circuit for one Grover application over a search space $N = 4$, with $M = 1$.



- Design a circuit for the oracle U_f.
- How many iterations are required to find the correct solution with high probability? Why? Which is the angle of the rotation in each iteration?
- How many queries to the oracle would be necessary under a classical computer?
- Prove that the gates in the dotted box perform the phase shift operation $2|00\rangle\langle 00| - I$, up to an irrelevant global phase factor.
- Prove the Grover iterator G is, as expected, unitary.