

Lab 5 Quantum calculation; Deutch problem

Exercise 1 Quantum calculation

Explain the idea of quantum calculation, explain the definition of U_f gate and its input and output registers.

Exercise 2 - Deutsch problem

1. Define Deutsch problem for one argument set of four functions
2. Find U_f gates for each function.
(hint: see fig 2.1 at <http://www.lassp.cornell.edu/mermin/qcomp/chap2.pdf>)
3. Implement and test U_f functions in the simulator;
4. Implement the solution of the Deutsch problem using quantum gates
(hint see left part of the fig 2.3

<http://www.lassp.cornell.edu/mermin/qcomp/chap2.pdf>)

5. Check the result of the solution. What is the gain in comparison to the classical computer? What information is missing?