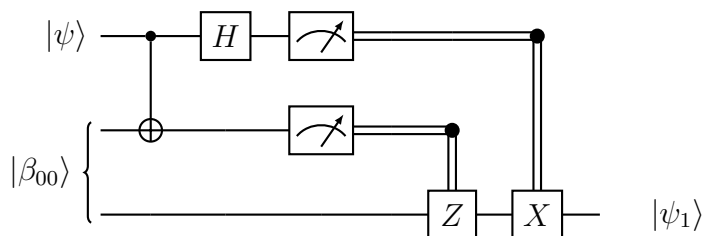


Quantum Algorithms

Homework 2

Problem 1

Bob gets confused and accidentally changes the role of X and Z in the quantum teleportation protocol. That is, he implements the circuit



What is $|\psi_1\rangle$? Explain how it's different from $|\psi_0\rangle$ and compute $\langle\psi_1|\psi_0\rangle$.

Problem 2

Alice and Bob decide that since the two measurements in the teleportation protocol are only controlling the third wire, they could potentially do the entire procedure using the $c - Z$ and $c - X$ (controlled Z and X) gates instead of any measurements on the top two wires. (Note that the $c - X$ gate is simply the CNOT gate.)

1. Draw the corresponding circuit and analyze the state that it produces.
2. Do Alice's measurements matter?
3. Why wouldn't you just do the procedure this way instead?

Problem 3

Read section 5.3 and do exercise 5.3.1.

Problem 4

Do exercise 6.1.2

Problem 5

Do exercise 6.3.1