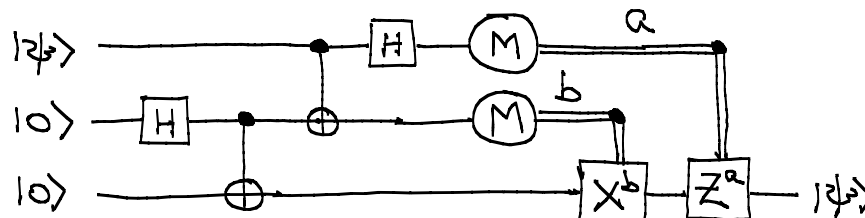


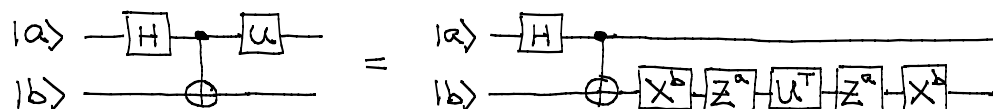
Homework Problem 5.1

**Teleportation from circuit diagrams.** The standard teleportation circuit is the following:

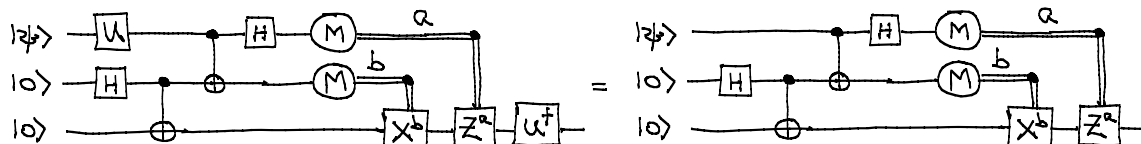


In this problem we demonstrate, using only circuit diagrams, that this circuit teleports the input state of the top qubit to the output state of the bottom qubit.

(a) By any means at your disposal, show the following circuit equivalence.



(b) Use the result of part (a) to show that the following circuit equivalence holds for any single-qubit unitary  $U$ .



(c) Use the result of part (b) to show that the standard teleportation circuit succeeds in teleporting the input state of the top qubit to the output state of the bottom qubit.