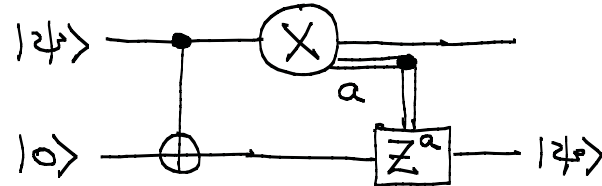


Homework Problem 2.3
(10 points)

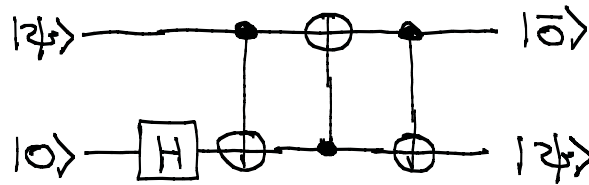
Due Tuesday, September 29
(at lecture)

2.3 **Another cheap teleportation primitive.** In the lectures we showed that the following circuit moves a state $|\psi\rangle$ from the top qubit to the bottom qubit, and we used this circuit to find a circuit that uses only measurements to apply a unitary U .

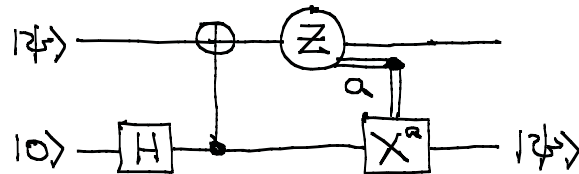


In this problem we explore another cheap teleportation primitive.

(a) Starting with the circuit below, consisting of a SWAP preceded by a Hadamard on the second qubit,



derive the following teleportation primitive:



Verify directly that this teleportation primitive moves $|\psi\rangle$ from the top qubit to the bottom qubit.

(b) Use the teleportation primitive of part (a) to *find* a single-qubit-unitary measurement circuit. You should find the same measurement circuit that we found for the teleportation primitive at the top.