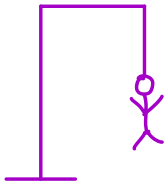
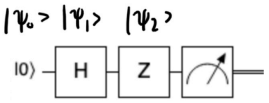
b a s e b a l l



m i n i V a n

e s o u t l

- Example:



$|\psi_0\rangle = |0\rangle$

$|\psi_1\rangle = H|\psi_0\rangle = H|0\rangle = \frac{|0\rangle + |1\rangle}{\sqrt{2}}$

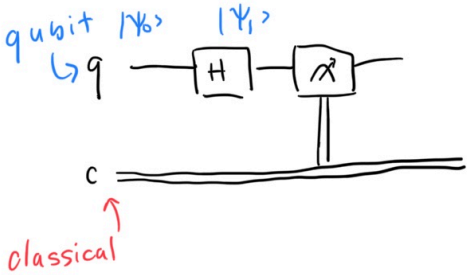
$|\psi_2\rangle = Z|\psi_1\rangle = Z\left(\frac{|0\rangle + |1\rangle}{\sqrt{2}}\right) = \frac{|0\rangle - |1\rangle}{\sqrt{2}}$

$H: H|0\rangle = \frac{|0\rangle + |1\rangle}{\sqrt{2}}$

$H|1\rangle = \frac{|0\rangle - |1\rangle}{\sqrt{2}}$

$Z: Z|0\rangle = |0\rangle$

$Z|1\rangle = -|1\rangle$

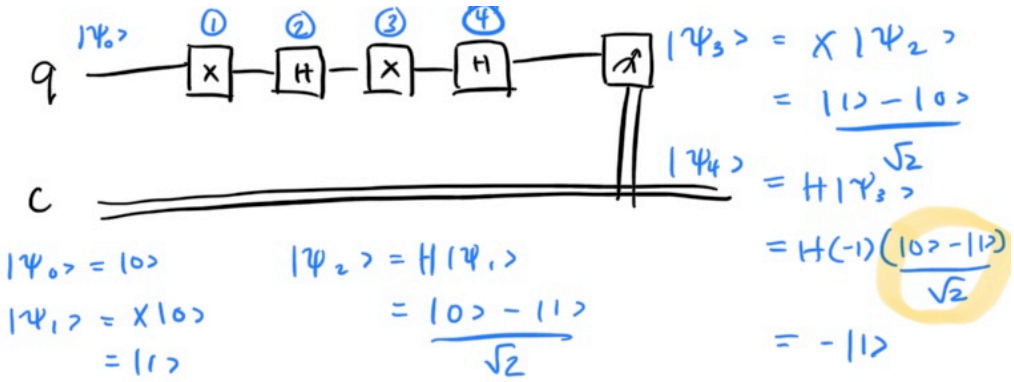


$|\psi_0\rangle = |0\rangle$

$|\psi_1\rangle = \frac{|0\rangle + |1\rangle}{\sqrt{2}}$

$= \frac{1}{\sqrt{2}}|0\rangle + \frac{1}{\sqrt{2}}|1\rangle$

$|\alpha|^2 = \left(\frac{1}{\sqrt{2}}\right)^2 = \frac{1}{2} = |\beta|^2$

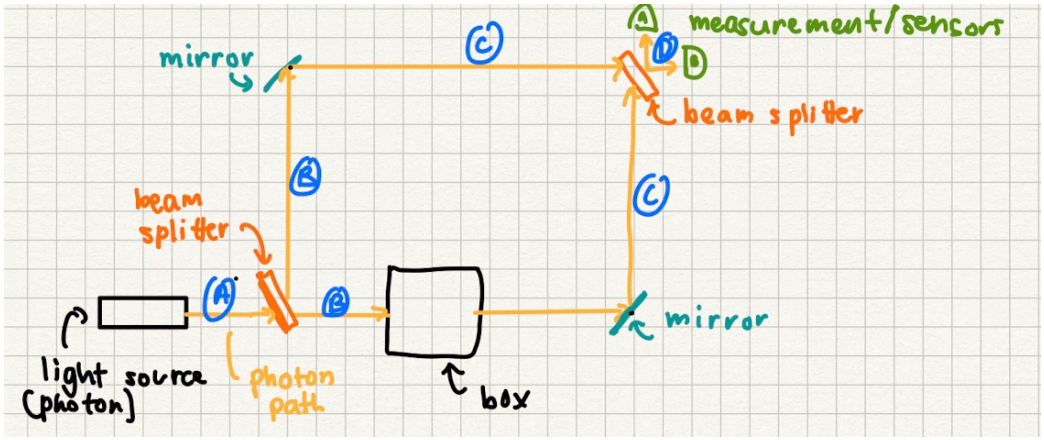


**Note: this didn't run properly during lecture -- the math here is correct (so we should have gotten 100% |1>) , but my python was having troubles :(

Challenge: Translate our puzzle from last week into a quantum circuit. Write it out using the circuit notation used in lecture, then code the circuit in python! If you're able to do this, I'll give out a prize of some sort

Recall: we made analogies between the quantum circuit and our set up -- use these to translate between the set up and the circuit

Quantum Circuit	Our Setup
Qubit	Photon.
$\|0\rangle$	$\|\rightarrow\rangle$
$\|1\rangle$	$\|\uparrow\rangle$
Hadamard (H)	Beam Splitter
Not (X) gate	Mirror.
Measurement Devices	A, B, Box



This was our set up (this is what you should translate into a quantum circuit) :

Send your answers to me on Discord or Email -- whichever you prefer :)