

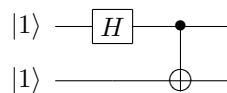
CSEP 590tv In Class Problems, July 6, 2005

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1. Let $|+i\rangle = \frac{1}{\sqrt{2}}|0\rangle + \frac{i}{\sqrt{2}}|1\rangle$ and $|-i\rangle = \frac{1}{\sqrt{2}}|0\rangle - \frac{i}{\sqrt{2}}|1\rangle$. These form an orthonormal complete basis for a qubit. Express the state $\frac{1}{\sqrt{2}}|0\rangle + \frac{1}{\sqrt{2}}|1\rangle$ in this basis.

Suppose we measure the state $\frac{1}{\sqrt{2}}|0\rangle - \frac{1}{\sqrt{2}}|1\rangle$ in the $|+i\rangle, |-i\rangle$ basis. What are the probabilities of the two outcomes corresponding to these two states?

2. What quantum state is output from the following circuit?



If we measure this output state in the computational basis, what are the probabilities of the four different outcomes?

