Swap test equations

Abstract

Equations typed in LaTeX to explain swap test circuit implemented with Qiskit in python. Complete description available here.

Equations

$$\frac{1}{\sqrt{2}}(|q_1 q_2 0\rangle + |q_1 q_2 1\rangle)$$

$\frac{1}{\sqrt{2}}(|q_1 q_2 0\rangle + |q_2 q_1 1\rangle)$, notice that $|q_1\rangle$ and $|q_2\rangle$ are swapped in the case that $|a_0\rangle = |1\rangle$

$$\frac{1}{2}(|q_1 q_2 0\rangle + |q_1 q_2 1\rangle + |q_2 q_1 0\rangle - |q_2 q_1 1\rangle)$$

$$\frac{1}{2}(|q_1 q_2 1\rangle + |q_1 q_2 0\rangle + |q_2 q_1 1\rangle - |q_2 q_1 0\rangle)$$

$$\frac{1}{2}(|qq1\rangle + |qq0\rangle + |qq1\rangle - |qq0\rangle) = \frac{1}{2}(2\,|qq1\rangle) = |qq1\rangle$$

$\frac{1}{2}(|011\rangle + |010\rangle + |101\rangle - |100\rangle)$, and nothing can be simplified