HOMEWORK: Advanced Entanglement

Advanced Enganglement HW

Select the true statements about quantum registers:

a. Quantum registers are used to share your quantum algorithms with others
b. Quantum registers hold a collection of qubits that can be used for computation
c. Unless otherwise specified, by convention, qubits in the quantum register are initialized to the ground state
d. Each qubit in a quantum register is represented as a wire in a quantum circuit diagram

$|000\rangle$ is the commonly-used shortcut for which notation?

a. $|0\rangle$
b. $|0\rangle \bullet |0\rangle \bullet |0\rangle$
c. $|0\rangle \otimes |0\rangle \otimes |0\rangle$

Advanced Enganglement HW

Determine the quantum state that results from the following circuit:
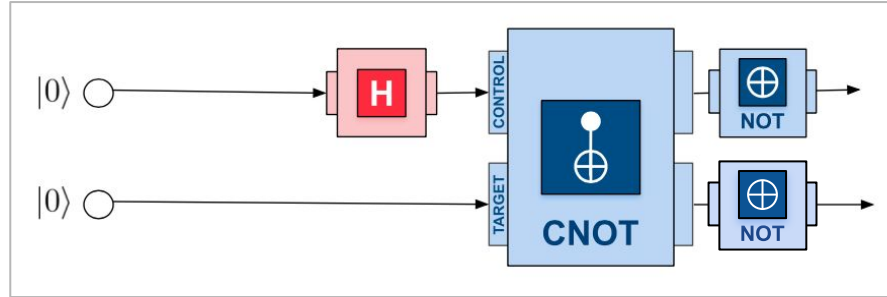
a.

$$|\Phi^+\rangle = \tfrac{1}{\sqrt{2}}(|00\rangle + |11\rangle) = \tfrac{1}{\sqrt{2}}\begin{bmatrix}1\\0\\0\\1\end{bmatrix}$$

c.

$$|\Psi^+\rangle = \tfrac{1}{\sqrt{2}}(|01\rangle + |10\rangle) = \tfrac{1}{\sqrt{2}}\begin{bmatrix}0\\1\\1\\0\end{bmatrix}$$

b.

$$|\Phi^-\rangle = \tfrac{1}{\sqrt{2}}(|00\rangle - |11\rangle) = \tfrac{1}{\sqrt{2}}\begin{bmatrix}1\\0\\0\\-1\end{bmatrix}$$

d.

$$|\Psi^-\rangle = \tfrac{1}{\sqrt{2}}(|01\rangle - |10\rangle) = \tfrac{1}{\sqrt{2}}\begin{bmatrix}0\\1\\-1\\0\end{bmatrix}$$