

Week assignment 07 (Homework vault part)

Deadline: 4. 12. 2020

Upload scan, photograph, or a typesetted pdf of computation to the corresponding homework vault. Do not forget to include your name and personal ID number (učo) on the page(s).

Exercise 1. [1pt] Determine whether the two-qubit state

$$|\Psi\rangle = \frac{1}{2}(|00\rangle - |01\rangle + |10\rangle - |11\rangle)$$

can be written in form $|\Psi\rangle = |\phi\rangle \otimes |\mu\rangle$ and if so, determine the vectors $|\phi\rangle$ and $|\mu\rangle$.

Exercise 2. [2pts] Show that

$$\text{CZ}_{A \rightarrow B} = \text{CZ}_{B \rightarrow A} = (\mathbb{1} \otimes H)\text{CNOT}_{A \rightarrow B}(\mathbb{1} \otimes H)$$

and using these two identities then show that

$$\text{CNOT}_{B \rightarrow A} = (H \otimes H)\text{CNOT}_{A \rightarrow B}(H \otimes H).$$

Exercise 3. [2pts] Find A , B , and C such that the two circuits perform the same multi-controlled operation.

