Week assignment 09 (Homework vault part)

Deadline: 13. 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).

In all exercises we will use the same state of Alice-Bob system,

$$|\psi\rangle = \frac{1}{3}\left[\sqrt{3}\,|00\rangle - 2i\,|10\rangle + (1-i)\,|11\rangle\right].$$

Exercise 1. [3pt] Suppose Bob performs measurement in computational basis. Compute probabilities p_j for particular outcomes $j \in \{0,1\}$, determine corresponding conditional states of Alice $|\phi_j\rangle$ and compute

$$\rho_A^1 = p_0\,|\phi_0\rangle\langle\phi_0| + p_1\,|\phi_1\rangle\langle\phi_1|.$$

Exercise 2. [2pts] Compute reduced density matrix for Alice, $\rho_A^2 = \mathrm{Tr}_B[|\psi\rangle\langle\psi|]$.

Exercise 3. [2pts] From states $\rho_A^{1,2}$ compute probabilities with which Alice measures outcomes $+$ and $-$ if she performs measurement in the Hadamard basis.