Multi Qubit

Tags	Part I	SubUnit II

Date: **@Feb 11, 2020**

Topic: Multi Qubit

Recall	Notes
Multi Qubit Representation	- Tensor Product! - n Basis $2^n - 2$ Degrees of freedom (-1 for =1, -1 for general phase)
Non-separable states	2 deg. for 1 qubit, 6 for 2! so there are states for 2 qubits that can't be factored in two indiv. ones. $\Rightarrow$ Entangled States!

$$|\psi\rangle = |\psi_1\rangle \otimes |\psi_2\rangle$$

$$\langle\phi|\psi\rangle = \langle\phi_1|\psi_1\rangle\langle\phi_2|\psi_2\rangle$$

Inner
Product

- Cannot take an unknown qubit and turn it into two copies of this unknown qubit.

- CNOT can clone classical information:
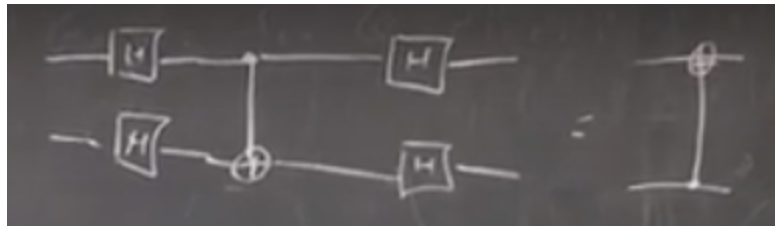
No-cloning
Theorem

- CNOT |x0> = |xx>

Note:

$$UMU^\dagger = \tilde{M} \leftarrow \text{new basis corresponding to M!}$$

$$H\sigma_z H = \sigma_x, \quad H\sigma_x H = \sigma_z$$

Identities

[Changing
basis with
unitaries]

📌 **SUMMARY:**