Problem set 5: Non-unitary processes
Due 24 Oct 2007

1) [inspired by Nika's question in class] In general terms, describe two qualitatively different scenarios for processes that make the density matrix of a quantum system less mixed (state more towards the outside of the Bloch sphere)?

Remember: the density matrix expresses our knowledge of the state of the quantum system.

2) Consider a first qubit described by some general (possibly mixed) density matrix, ρ, and a second qubit in the state $|0\rangle$. Let a CNOT gate act on the joint system, with the first qubit as the control qubit.

Find an operator sum representation (a set of E_k) that describes the process that the first qubit by itself undergoes.