

return date: Thu Nov 29

1. Find a sequence of basic errors (phase shift, bit flip) which transforms the state

$$|\psi_1\rangle = \frac{1}{2}(|00\rangle - |01\rangle + |10\rangle - |11\rangle)$$

into the state

$$|\psi_2\rangle = \frac{1}{2}(-i|00\rangle + i|01\rangle + i|10\rangle - i|11\rangle).$$

Represent the error sequence as multiplication of $|\psi_1\rangle$ by a suitable combination of Pauli matrices (p.218).

2. We have a joint state $|\psi_1\rangle \otimes |\psi_2\rangle \otimes |\psi_3\rangle$, and we would like to use symmetrization (p. 227) on it.
 - a) How many ancilla qubits are needed?
 - b) What is the state of the system (joint state qubits and ancillas), after we have applied the operator which permutes the $|\psi_i\rangle$? (Choose you favorite mapping from permutation numbers i to qubit combinations in ancillas).
 - c) Next, perform the inverse operation on ancillas. What is the system state now?