MA565: Homework 7

Exercise 7.1. [2pts] Consider a three qubit state $\frac{1}{3}|000\rangle + \frac{2}{3}|010\rangle + \frac{2}{3}|100\rangle$. What is the probability to get 0 measuring the first qubit?

Exercise 7.2. [2pts] Show that $HZH = X$.

Exercise 7.3. [6pts] Compute the state obtained by an application of H to the first qubit in a two qubit state $|\psi\rangle = \frac{1}{2}|00\rangle - \frac{i}{\sqrt{2}}|01\rangle + \frac{1}{\sqrt{2}}|11\rangle$.

Exercise 7.4. [+1pt] Show that a unitary transformation cannot "delete" information: there is no 1-qubit unitary U that maps $|\psi\rangle \to |0\rangle$ for every 1-qubit state $|\psi\rangle$.