Note on Homework 6

4.8 Check the effect of the matrix on $|000\rangle, |010\rangle, |100\rangle, |110\rangle$.

4.9 Apply CCNOT to $|x, y, 1\rangle$.

4.10 Follow the suggestion in the problem.

4.11 Organize the vector as: $\frac{1}{\sqrt{2}}|0\rangle(c_1|0\rangle + c_2|1\rangle) + \frac{1}{\sqrt{2}}|1\rangle(c_3|0\rangle + c_4|1\rangle)$.

4.12 Assume the first column of U is $(a, b, c, d)^t$. Let U_1, U_2, U_3 be ...

4.13 Routine calculation.

4.14 Just follow the circuit in Fig. 4.7.

4.15 Show that the matrices are $|0\rangle\langle 0| \otimes I_2 + |1\rangle\langle 1| \otimes V_j$ for $j = 1, 2$, and ...

4.16 and **4.17** Write down the matrices in tensor form, the bra and ket vectors carefully, and verify.