Assignment 5

Due by class time Tuesday, September 27

Practice exercises (NOT to turn in)

Read Chapter 2, sections 2.1, 2.2, and 2.3 (pages 29-53) of *Quantum Computing for Computer Scientists*. As you read, do the exercises listed below to test your comprehension of the material. The answers to these exercises can be found in the back of the book (Appendix B), so you should check your own answers as you go. In class on Tuesday, we will go over any exercises you had trouble with.

To avoid the tedium of doing lots of complex number arithmetic by hand, I would recommend using WolframAlpha.com, or something similar. You can type in complex number expressions directly. For example, to multiply $2 + 3i$ by $4 - i$, just type `(2+3i)*(4-i)`. To square $5 - 2i$, just type `(5-2i)**2`, etc. Of course, it's also possible to do more advanced computations in WolframAlpha like matrix multiplication, inner product, etc., but since the point of the homework is for you to learn how to do these computations yourself, you should only use WolframAlpha for simple complex number arithmetic, at least for now.

- Exercise 2.1.1 (page 31) — complex vector addition

- Exercise 2.1.3 (page 33) — scaling a complex vector

- Exercise 2.2.5 (page 39) — transpose, conjugate, adjoint of a matrix

- Exercise 2.2.8 (page 40) — matrix multiplication

- Exercise 2.2.10 (page 42) — matrix multiplication, transpose

- Exercise 2.3.1 (page 47) — linear independence

- Exercise 2.3.2 (page 47) — basis vectors

- Exercise 2.3.3 (page 52) — matrix multiplication