LINEAR ALGEBRA
Homework
Monday, April 22

Follow the separate general guidelines for Parts A,B,C. Be sure to include and label *all four* standard parts (a), (b), (c), (d) of Part A in what you hand in.

Self-Adjoint and Normal Operators (Part II): Self-Adjoint Operators; Normal Operators
Section 7.A, pp. 209–214

A: Reading questions. Due by 2pm, Sun., 28 Apr.

1. Verify that the sum of two self-adjoint operators is self-adjoint, as the textbook suggests you do on p. 209.
2. Where in the proof of result 7.13 (Eigenvalues of self-adjoint operators are real) do we use that T is self-adjoint?
3. What is the relationship between self-adjoint and normal operators? (If an operator is self-adjoint, do you know whether it is normal? If an operator is normal, do you know whether it is self-adjoint?)
4. Verify result 7.20 (T is normal...) on Example 7.19.
5. Verify that if λ is a scalar and T is normal then $T - \lambda I$ is also normal, as the textbook suggests you do in the proof of result 7.21 (For T normal, T and T^* have the same eigenvectors).
6. Verify result 7.22 (Orthogonal eigenvectors for normal operators) on Example 7.19.

B: Warmup exercises. For you to present in class. Due by the end of class Mon., 29 Apr.

Exercises 7.A: 7, 14

The Spectral Theorem
Section 7.B

A: Reading questions. Due by 2pm, Tue., 30 Apr.

1. What is the significance of normal operators and self-adjoint operators, as revealed in this section?
2. Verify all the details of Example 7.23.
3. Compare the **proof** of result 7.27 (Self-adjoint operators have eigenvalues) with the **proof** of result 5.21 (Operators on complex vector spaces have an eigenvalue).
4. Verify the details of Example 7.30.

B: Warmup exercises. For you to present in class. Due by end of class Wed., 1 May

Exercises 7.B: 2