LINEAR ALGEBRA

STRANG, SECTION 4.4

1. The assignment

- Read section 4.4 of Strang (pages 230-238).
- Read the following.
- Prepare the items below for presentation.

2. Orthonormal bases, orthogonal matrices, and the Gram-Schmidt Algorithm

There are four main points to take away from this section:

- The idea of an orthonormal basis.
- The idea of an orthogonal matrix. The special property that $Q^T = Q^{-1}$ for an orthogonal matrix Q.
- The Gram-Schimdt algorithm for constructing an orthonormal basis.
- The QR decomposition of a matrix A.

3. Sage instructions

I have made a Sage worksheet file with some basic commands that you might find useful. The file is called `section4_4.sagews`.

4. Questions for Section 4.4

Please do exercises 12 and 18 to be sure you feel comfortable with the basic idea behind the Gram-Schmidt algorithm. I don't plan to discuss these unless everyone feels lost on them. In particular, exercise 12 shows one reason why one might prefer an orthonormal basis to just any old basis.

Exercise 131. Exercise 18 from section 4.4 of Strang.

Exercise 132. Exercise 19 from section 4.4 of Strang.

Exercise 133. Exercise 21 from section 4.4 of Strang.

Exercise 134. Exercise 23 from section 4.4 of Strang.

Exercise 135. Exercise 24 from section 4.4 of Strang.