Homework 7

Due date: April 20, 2016, 11:55PM.

   Bibliography: Course lecture notes Lessons 27-29. Textbook pp. 425-432, Section 8.5.

   We study the final important matrix decomposition covered in this course, the singular value decomposition (SVD). After understanding the basic computational procedures in Q1, feel free to use Octave to carry out arithmetic.

1. (1 course point) Textbook p.432, Exercise 8.5.1

2. (1 course point) Textbook p.433, Exercise 8.5.4 and 8.5.5.(a)

3. (1 course point) Textbook p.433, Exercise 8.5.13

4. (1 course point) Textbook p.433, Exercises 8.5.15-8.5.18 (include argument for deciding whether T or F)

5. (Computer application 4 course points) We highlight the role the SVD plays in *data compression* and *model reduction*.

   Task 1. (2 course points). Choose an image of particular relevance to your interests. Follow the procedures in Lesson29 and show:

      a) Plot of singular values (log10 coordinates)

      b) Sequence of images obtained by truncating SVD expansion at various values p

   Task 2. (2 course points). Revisit your point mass spring work from HW5. Construct a reduced model using just the first 3 eigenmodes.