

18/08/2013

MSc. Applications of Mathematics

Linear Algebra - Homework 3

(Due on 26/08/2013 at 10:30 a.m.)

Instructions:

- Solutions must be complete and legible in order to earn maximum points.
- You may discuss and work together if necessary but you must write your own solutions. Copied solutions (from each other or books or the internet) are easy to identify and easier to grade as they can only earn a zero.

1. Calculate the condition number of the matrix

$$A = \begin{pmatrix} 1 & 2 \\ 0 & 2 \end{pmatrix}$$

using the 1, 2 and ∞ -norms.

2. Calculate the full and reduced singular value decompositions of the matrix

$$A = \begin{pmatrix} 3 & 2 & 2 \\ 2 & 3 & -2 \end{pmatrix}$$

3. Let A be a $m \times n$ matrix of full rank ($m \geq n$). What is the condition number of A in terms of the singular values of A ? (Hint: Use SVD of A .)

Note: Unless mentioned otherwise, the 2-norm is used to calculate the condition number.

4. Write an essay discussing the differences between the eigenvalue decomposition and the singular value decomposition. Include one or more examples to illustrate your points.