The following problems, unless specifically noted, refer to the exercises in the book *Numerical Linear Algebra*, by Lloyd N. Trefethen and David Bau, III, SIAM 1997.

Homework 2

Reading: Lectures 3-5.

Problems: Exercises 3.2, 3.5; Exercise 4.1; Exercise 5.4.

Two additional problems:

A1. For a matrix $A \in \mathbb{C}^{m \times n}$, prove

$$\|A\|_\infty = \max_{1 \le i \le m} \sum_{j=1}^{n} |a_{ij}|.$$

A2. In MATLAB, type in the following lines which will generate an image with full rank. Continue this code and plot rank-1, rank-10, rank-50, and rank-150 approximations to the original image. Attach the script you used to generate the results.

```
% load the image
I = imread('cameraman.tif');
% convert image to double precision
A = im2double(I);
% perform SVD for the matrix A such that A = U*S*V'
[U,S,V] = svd(A);
% show the full rank image
imshow(A); title('full rank image');
```