

Assignment #3

Due Monday, 28 September, 2015 at the start of class

Please read Lectures 3, 4, 5, and 9 in the textbook *Numerical Linear Algebra* by Trefethen and Bau. Do these exercises:

P7. On page 12 of the textbook, equation (2.4) says $(AB)^* = B^*A^*$. Prove this by showing that the matrix entries are equal.

P8. On page 21 of the textbook, equation (3.10) gives a formula for the ∞ -norm of an $m \times n$ matrix. Prove this:

$$\|A\|_{\infty} = \max_{1 \leq i \leq m} \|a_i^*\|_1.$$

Exercise 2.6 in Lecture 2.

Exercise 3.3 in Lecture 3. Do parts (a) and (b) only.

Exercise 4.3 in Lecture 4. *Comments:* Use the built-in “svd” command. For instance, these commands will find v_1, v_2 and u_1, u_2 :

```
[U, S, V] = svd(A);
v1 = V(:, 1);
v2 = V(:, 2);
u1 = U(:, 1);
u2 = U(:, 2);
```

Your code should be a function with a first line like “function showsvd(A).” Consider using `subplot(1, 2, 1)` and `subplot(1, 2, 2)` for the left and right parts of the figure, respectively. Finally, a goal is to make it look clean like Figure 4.1, probably including commands “axis off” and “axis equal”. In what you turn in, include the code and the output for the four 2×2 matrices from Exercise 4.1.