18.335 Problem Set 2

Due Fri., 27 February 2015.

Problem 1: Stability

(a) Trefethen, exercise 15.1. [In parts (e) and (f), assume that $\frac{1}{k!}$ can be computed to $O(\epsilon_{\text{machine}})$ and concentrate on the accumulation of errors in the summations.]

(b) Trefethen, exercise 16.1.

Problem 2: Norms

(a) Derive Trefethen eq. (3.10) (for which Trefethen only writes "by much the same argument"). Find the code that computes the $\|A\|_\infty$ norm in Julia, the `norm(A, Inf)` function, by typing `methods(norm)` in IJulia and following the appropriate link; satisfy yourself that it is equivalent to (3.10).

(b) Trefethen, problem 3.4. Check your result for a random 10×7 matrix A in Julia, constructed by `A=randn(10,7)` with the $p = 2$ norm as computed by `norm(A)` in Julia.

Problem 3: SVD and low-rank approximations

(a) Trefethen, probem 4.5.

(b) Trefethen, problem 5.2.

(c) Trefethen, problem 5.4.