Math 46: Applied Math: Homework 4

due Wed Apr 25   . . . but best if do relevant questions after each lecture

In initial-layer problems: keep in mind that the ICs will fix all unknowns in the inner approximation, and only then can you find the unknown in the outer approximation.

p.100-104: #10. What every linear algebra student should know about $A\mathbf{x} = \mathbf{b}$: its sensitivity to perturbation! You will find plain old simultaneous equations easier here than augmented matrix. Also answer: i) For what value of ε does all hell break loose? (Is 0.01 near this?) ii) Write a 2-term perturbation expansion (in ε) for x, y. By roughly what factor do small ε changes from zero get amplified?

p.121-123: #10. Whether there's a boundary layer at each end is determined by the outer approximation, weirdly. (First please see errata).

p.133-135: #1. Please state what order the uniform convergence of the residual is.

#3.

p.141-142: #1 (rewrite λ in terms of more usual ε)

#2.

#3.

p.148-150: #4 a. As you take derivatives, try to notice which ones will survive when you insert $t = 0$ to save you effort.

#8. (you may check your answer on wikipedia!)