

Math 46: Applied Math: Homework 1

due Wed Apr 4 . . . but best if do relevant questions after each lecture

- p.7-8:** #2 [hint: what are the dimensions of energy?]
#5,
#6 (your plot need only be a sketch. Try to choose your definitions of s and y so the plot is a straight line).
- p.17-19:** #1, (easy),
#4 (easy),
#9 ('concentration' is the same as mass density; for the last step follow the text above Eqn (1.9)).
- p.30-34:** #3 (notice how 3 parameters a, b, ρ can be reduced to *zero* parameters by rescaling),
#4 (you should end up with an ODE with a single small parameter ε - what is it?),
#10 (now several steps are left up to you; you should end up with only one free parameter).
#11 (when you reformulate the problem in b, don't forget the initial conditions too. How many ways of nondimensionalizing the problem are there?).
- p.40-44:** #1 a, b, c, d, h (these are review of Math 23; keep in mind the tricks on p.38)
#3 Since you've already done a and most of b, finish b and answer the slightly tricky first question in c. [Hint: to check, do you get the expected time when air resistance vanishes?]