Homework #6

Hand In: 3.1 #14; 3.2 #22; 3.3 #18; 3.4 #12; 3.5 #17; 3.6 #10; 3.7 #12; plus problem #N at the bottom of this page.

Certainly not all of these will be graded, but I want you to have some practice writing these up carefully.

Other problems:

Section 3.1: 1,6,12,13,14,21

Section 3.2: 1,3,9,13,14,15,17,22

Section 3.3: 2,3,11,18,34,35

Section 3.4: 3,12,21,24

Section 3.5: 3,5,17,30

Section 3.6: 3,10

Section 3.7: 11,12

Section 3.8: 3,5,7

#N: Consider the initial value problem

$$x'' - 2x' - x = t \text{ with } x(0) = 0,\ x'(0) = 0.$$

As we discussed in class, this is equivalent to the system of first order differential equations

$$x' = y \text{ and } y' = x + 2y + t \text{ with } x(0) = 0, y(0) = 0.$$

whose solution is the limit of a sequence of Picard iterates, $x_n(t)$, $y_n(t)$, starting with the initial guess

$$x_0(t) = 0 \text{ and } y_0(t) = 0$$

for all t.
(a) Give the formula expressing $x_{n+1}(t)$ and $y_{n+1}(t)$ in terms of $x_n(t)$ and $y_n(t)$.
(b) Use the formula in (a) to find the first three Picard iterates $x_n(t)$ and $y_n(t)$, $n = 1, 2, 3$.

Note: Completing (b) involves a lot of calculation. You need only hand in the result.