Part II Problems

Problem 1: [ODEs via Laplace transform] Let a and b be real numbers, with $a \neq 0$.

(a) Find the unit impulse response and unit step response for the first order operator $aD + bI$ by using Laplace transform methods to solve initial value problems with rest initial conditions.

(b) Solve $a\dot{x} + bx = t\,u(t)$ with rest initial conditions in three ways.
(i) Undetermined coefficients to get x_p, and add the appropriate transient.
(ii) Compute $w(t) * t$ (using the value for $w(t)$ you found in **(a)**).
(iii) Apply Laplace transform, solve, and transform back.

18.03SC Differential Equations
Fall 2011