7. [15 points] Consider the system of differential equations $x' = 3x + 4y$, $y' = 2x + y$, with initial conditions $x(0) = 0$, $y(0) = 2$.

a. [6 points] Using Laplace transforms, find explicit equations for $X = \mathcal{L}\{x\}$ and $Y = \mathcal{L}\{y\}$.

b. [4 points] Find x and y in terms of any constants you may have in partial fractions expansions of X and Y (that is, do not solve for the values of those constants).

c. [5 points] If we rewrote the system as a second order differential equation $L[y] = 0$ for y, what would the characteristic equation for λ be? What is the linear operator L?