MATH 211: 11-27 WORKSHEET

(1) Check that $y = A\cos(2t)$ is a solution to the differential equation $y'' = -4y$, where A is a parameter.
(2) Check that $y = B\sin(2t)$ is also a solution to $y'' = -4y$, where B is a parameter.
(3) Find the general solution to the differential equation $y' = e^{4x} - 2x$.
(4) Find the solution to the differential equation $y' = e^{4x} - 2x$ satisfying the initial condition $y(0) = 1$.
(5) Find the solution to the differential equation $xy' = 1$ satisfying $y(1) = 2$.

The *order* of a differential equation is the highest order of a derivative appearing in the equation. Most differential equations used in applications are first order (only talk about y') or second order (only talk about y'' and y').

(1) Consider the first-order differential equation $y' = e^x$. Find the general solution. How many parameters are needed to parameterize the general solution?
(2) Consider the second-order differential equation $y'' = x$. Find the general solution. How many parameters are needed?
(3) Consider the third-order differential equation $y''' = \cos x$. Find the general solution. How many parameters are needed?
(4) Make a conjecture about how many parameters are needed for the general solution of an nth order differential equation.