MATH 3413 Homework 4 Due Wed, Sep 29, 2010

Sec. 3.3: problems 14, 16, 23, 40, 42, 43(a,b).

Sec. 3.5: problems 2, 9, 22, 29, 32.

Hint for Problem 3.5/9: Since the right-hand side of the equation can be written as $f_1(x) + f_2(x)$ with $f_1(x) = 1$ and $f_2(x) = xe^x$, look separately for a particular solution $y_{p,1}(x)$ of the ODE

$$y'' + 2y' - 3y = f_1(x) \ ,$$

and for a particular solution $y_{p,2}(x)$ of the ODE

$$y'' + 2y' - 3y = f_2(x) \ .$$

Then the particular solution $y_p(x)$ of the original non-homogeneous ODE,

$$y'' + 2y' - 3y = f_1(x) + f_2(x) \ ,$$

has the form

$$y_p(x) = y_{p,1}(x) + y_{p,2}(x).$$

Hints for Problems 3.5/22 and 3.5/29: See the hint for Problem 3.5/9. Once you have found a particular solution $y_p(x)$ of the original non-homogeneous ODE $Ly(x) = f(x)$, then the general solution $y(x)$ of the original non-homogeneous ODE is a sum of the general solution $y_c(x)$ of the associated homogeneous ODE $Ly(x) = 0$, and $y_p(x)$:

$$y(x) = y_c(x) + y_p(x) \ .$$

Note that $y_c(x)$ must have the right number of arbitrary constants (equal to the order of the ODE).