MAT 239 (Differential Equations), Prof. Swift
Worksheet 18, The General Solution of a LHODECC.

1. Suppose the characteristic equation of a LHODECC for $y(x)$ factors over the real numbers as $(r^2 + 4)^2(r - 5)^3 = 0$.

(a) What are the roots of the characteristic equation?

(b) What is the general solution of the LHODECC?

2. Suppose one solution of a 5th order LHODECC is $y(x) = 3x^2 + 4e^x \sin(2x)$.

(a) What are the roots of the characteristic equation of the LHODECC?

(b) What is the simplest general solution of a LHODECC that contains the function $y(x) = 3x^2 + 4e^x \sin(2x)$?

Rule 1 says that the first guess for the *form* of the particular solution to a LNODECC, $L[y] = g(x)$ is the simplest general solution of a LHODECC that contains the function $g(x)$.

3. Use Rule 1 and Problem 2 to find the *form* of the particular solution to the LNODECC $y'' + y' + y = 3x^2 + 4e^x \sin(2x)$. This will have 5 undetermined coefficients A, B, C, D, and E.

4. (a) Use Rule 1 to find the *form* of the particular solution to the LNODECC $y'' + y' + y = 3e^{2x}$. This will have a single undetermined coefficient A.

(b) Find a particular solution to that same LNODECC, $y'' + y' + y = 3e^{2x}$.