

In Problems 1–26 solve the given differential equation by undetermined coefficients.

3.

$$y'' - 10y' + 25y = 30x + 3$$

7.

$$y'' + 3y = -48x^2 e^{3x}$$

8.

$$4y'' - 4y' - 3y = \cos(2x)$$

13.

$$y'' + 4y = 3 \sin(2x)$$

21.

$$y''' - 6y'' = 3 - \cos(x)$$

Suppose that you are given a 6<sup>th</sup> order linear differential equation with constant coefficients

$$a_6 y^{(6)} + a_5 y^{(5)} + \cdots + a_1 y' + a_0 y = f(x)$$

and that the auxiliary equation of the complementary differential equation can be written in factored form as

$$m^3(m+3)(m-(2+5i))(m-(2-5i)) = 0$$

(i) Write the general solution  $y_c$  of the complementary differential equation.

In each part below, a different function  $f(x)$  is given for the above differential equation. Give the form of a particular solution  $y_p$  of the DE that one should look for according to the method of Undetermined Coefficients. (Do not attempt to solve for the coefficients)

(ii)

$$f(x) = e^{-3x}$$

(iii)

$$f(x) = 4x + 7$$

(iv)

$$f(x) = \cos(6x)$$

(v)

$$f(x) = e^{2x} \sin(5x)$$

(vi)

$$f(x) = xe^{-3x}$$