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

3.

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

7.

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

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^{th} order linear differential equation with constant coefficients

$$a_6y^{(6)} + a_5y^{(5)} + \cdots + a_1y' + a_0y = f(x)$$

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**)

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