4.6 - Variation of Parameters

Consider the homogeneous second-order differential equation $a_2(x)y'' + a_1(x)y' + a_0(x)y = 0$. The general solution to this DE is $y = c_1y_1 + c_2y_2$. When the input function of an associated nonhomogeneous DE is not restricted to the type we saw in 4.4, we consider particular solutions with coefficients that are variable functions. That is, we will find $y_p(x) = u_1(x)y_1(x) + u_2(x)y_2(x)$.

Ex: Solve each differential equation by variation of parameters.

$y'' + y = \sec\theta \ \tan\theta$

Ex: Solve the initial-value problem by variation of parameters.

$2y'' + y' - y = x + 1 \qquad y(0) = 1,\ y'(0) = 0$

Ex: Solve the differential equation by variation of parameters.

$y'' - 4y = \frac{e^{2x}}{x}$

Ex: Solve the differential equation by variation of parameters.

$$y'' - 4y = \frac{e^{2x}}{x}$$

Ex: Solve the given third-order differential equation by variation of parameters.

$y''' + 4y' = \sec 2x$