The inhomogeneous linear differential equation with constant coefficients

$$y^{(n)} + a_{n-1}y^{(n-1)} + \ldots + a_2y'' + a_1y' + a_0y = g(x)$$

The solutions y(x) are obtained using the theorem: $y = y_h + y_p$.
The number λ in the middle column is the μ-fold solution of the *characteristic equation.*
For certain g(x), the approach you should take for y_p can be found below.

Perturbation g(x)	λ	Approach for y_p
1) $g(x) = ae^{rx}$	r	$y_p(x) = Ax^{\mu}e^{rx}$
2) $g(x) = a\cos\beta x + b\sin\beta x$	βi	$y_p(x) = x^{\mu}(A\cos\beta x + B\sin\beta x)$
3) $g(x) = a_0 + a_1x + \ldots + a_nx^n$	0	$y_p(x) = x^{\mu}(A_0 + A_1x + \ldots + A_nx^n)$
4) $g(x) = P(x)e^{rx}\cos\beta x + Q(x)e^{rx}\sin\beta x$ P(x), Q(X) - Polynomials	$r+\beta i$	$y_p(x) = x^{\mu}(U(x)e^{rx}\cos\beta x + V(x)e^{rx}\sin\beta x)$ U(x), V(x) – polynomials whose degree is equal to the maximum degree of the polynomials P(x) and Q(x)
5) Linear Combination of 1)-4)		Linear Combination of 1)-4)

The unknown coefficients for $y_p(x)$ are obtained by comparing coefficients.
For other perturbations, Green's function are typically used.