Finding Particular Solutions to $Ly = f(x)$

$f(x)$	Form of y_p
$a_n x^n + \cdots + a_1 x + a_0$	$x^\ell \left(A_n x^n + \cdots + A_1 x + A_0\right)$
$ae^{\alpha x}$	$x^\ell A e^{\alpha x}$
$(a_n x^n + \cdots + a_1 x + a_0)e^{\alpha x}$	$x^\ell \left(A_n x^n + \cdots + A_1 x + A_0\right) e^{\alpha x}$
$a\cos(\beta x) + b\sin(\beta x)$	$x^\ell (A\cos(\beta x) + B\sin(\beta x))$
$p(x)\cos(\beta x) + q(x)\sin(\beta x)$	$x^\ell (P(x)\cos(\beta x) + Q(x)\sin(\beta x))$
$ae^{\alpha x}\cos(\beta x) + be^{\alpha x}\sin(\beta x)$	$x^\ell (Ae^{\alpha x}\cos(\beta x) + Be^{\alpha x}\sin(\beta x))$
$p(x)e^{\alpha x}\cos(\beta x) + q(x)e^{\alpha x}\sin(\beta x)$	$x^\ell (P(x)e^{\alpha x}\cos(\beta x) + Q(x)e^{\alpha x}\sin(\beta x))$

where

$$p(x) = a_n x^n + \cdots + a_1 x + a_0, \qquad q(x) = b_m x^m + \cdots + b_1 x + b_0$$
$$P(x) = A_N x^N + \cdots + A_1 x + A_0, \qquad Q(x) = B_N x^N + \cdots + B_1 x + B_0, \quad N = \max\{n, m\}$$

and ℓ is the smallest non-negative integer such that $y_p = x^\ell y_g$ has no terms which solve the homogeneous equation.