

More generally, if we are given the ODE $ay'' + by' + cy = P(t)$, where P is a polynomial then we can test the candidate $y = Q(t)$ where Q is of the same degree as P , with coefficients TBD.

* More examples:

① $y'' + 3y' + 2y = e^{2t}$

Test candidate $y = Ae^{2t}$.

② $y'' + 3y' + 2y = \sin 3t$

Test candidate $y = A \cos 3t + B \sin 3t$.

③ $y'' + 3y' + 2y = te^{2t}$

Test candidate $y = (At + B)e^{2t}$.

④ $y'' + 3y' + 2y = t + e^t + \sin t$

Split:

$$y'' + 3y' + 2y = t$$

$$y'' + 3y' + 2y = e^t$$

$$y'' + 3y' + 2y = \sin t$$

} Solve three eqs. independently of each other. Get y_1, y_2, y_3

Then $y = y_1 + y_2 + y_3$.

This is known as the superposition principle.