

Variation of Parameters

Mathematics

The general method for a particular integral, and the Wronskian it needs.

Build the particular integral from the two homogeneous solutions, weighted by integrals involving the forcing term.

$$y_p = -y_1 \int (y_2 f/W) + y_2 \int (y_1 f/W)$$

The Wronskian W

Never zero if independent.

$$y_1 y_2' - y_2 y_1'$$

W = 0 somewhere

The method fails.

Solutions are dependent

f(x) = sec x

So use this method.

No trial form exists

THE COMMON MISTAKE

✗ **Applying it before standardising the equation**

✓ **Dividing so the y'' coefficient is 1**

The formula assumes a leading coefficient of one. Forgetting to divide scales the particular integral by the wrong factor throughout.

It works everywhere undetermined coefficients works, and also where that fails. The only cost is two further integrals.