

## Nonhomogeneous Linear Differential Equations

This text is concerned with the solutions to non-homogeneous linear differential equations, which have the form

$$\mathbf{L}u = \phi,$$

over an interval  $a \leq x \leq b$  and subject to certain boundary conditions, where  $\mathbf{L}$  is an  $n$ th order linear ordinary differential operator and where the function  $\phi$  is integrable on the given interval.<sup>1</sup> We begin by proving a theorem about such operators.

---

<sup>1</sup>For  $\mathbf{L}$  to be linear, it must satisfy the condition

$$\mathbf{L}(\alpha v + \beta w) = \alpha v + \beta \mathbf{L}w$$

arbitrary functions  $v$  and  $w$ , with  $\alpha$  and  $\beta$  being constant.