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**Integral Equations**  
Due to

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## Exercise List 1

1. Solve the Volterra equation

$$\varphi(s) - \int_0^s (s-t) \varphi(t) dt = 2s.$$

2. Please show: The Fredholm integral equation

$$x(s) - \int_0^1 x(t) dt = s$$

has no solutions in  $C[0, 1]$ .

3. Solve the Volterra equation

$$\varphi(s) - 4 \int_0^s (s-t) \varphi(t) dt = s^3.$$

4. Reduce the initial value problem

$$y^{(3)} + 2xy = 0, \quad y(0) = y'(0) = 0, \quad y''(0) = 1$$

to an equivalent Volterra equation of the second kind.

5. Solve the Volterra equation of the first kind

$$\int_1^s (s+t) \varphi(t) dt = s^3 - 1.$$