Exercise 4

Classify the following equations as Fredholm, or Volterra, linear or nonlinear, and homogeneous or inhomogeneous

$$u(x) = \lambda \int_{-1}^{1} t^2 u(t)\, dt$$

Solution

This is a Fredholm integral equation because both limits of integration are constant. It is linear because the exponent of u is 1 wherever it appears in the equation. It is homogeneous because there is no function outside the integral other than $u(x)$.