Exercise 1

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

$$u(x) = 1 + \int_0^x (x-t)^2 u(t)\, dt$$

Solution

This is a Volterra integral equation because one of the limits of integration is not constant. It is linear because the exponent of u is 1 wherever it appears in the equation. It is inhomogeneous because of 1 on the right side in front of the integral.