Exercise 3

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

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

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 homogeneous because there is no function outside the integral other than $u(x)$.