

## Exercise 5

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

$$u(x) = 1 + x + \int_0^x (x-t) \frac{1}{1+u^2} dt$$

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### Solution

This is a Volterra integral equation because one of the limits of integration is not constant. It is nonlinear because of the nonlinear function of  $u$  inside the integral,  $1/(1+u^2)$ . It is inhomogeneous because of  $1+x$  on the right side in front of the integral.