

Homework Assignment Number Seven

On the course website, there are programs which solve:

- (i) a single first-order linear ordinary integral equation
- (ii) a single first-order non-linear ordinary integral equation

Problem 1.

Classify and numerically solve the following integral equation.

$$\phi(x) = \frac{x^2}{100} + \frac{5}{2} \int_5^x e^{-\frac{(x+y)}{10}} [\sin(\phi(y))]^2 dy$$

Solve for $x = 5$ to 10 .

Classify as linear/nonlinear, Volterra/Fredholm, first/second kind.

Provide a plot of the solution.

Demonstrate (1) the effect of changing the increment size (use say 5 and 20 intervals).

Demonstrate (2) the convergence of the method by looking at the solution at each iteration.