

Assignment H1

Deadline for submission:
Monday, May 5th, 16:00, at the beginning of the tutorial

Problem 1: (3 points)

Classify each of the following integral equations:

a) $y(x) - \int_0^1 (x^2 + t^2) y(t) dt = x^2$

b) $y(t) - \int_0^t (t - \tau) y(\tau) d\tau = t$

c) $\int_0^t \frac{(t-\tau)^{m-1}}{(m-1)!} y(\tau) d\tau = f(t), \quad m \geq 1.$

Problem 2: (4 points)

Give a detailed calculation of the solution of the integral equation

$$u(x) - \lambda \int_0^1 t x u(t) dt = 1, \quad 0 \leq x \leq 1.$$

Problem 3: (3 points)

Calculate the general solution of the ODE

$$y' = -\frac{y}{x} + 1.$$

Then calculate a solution with $y(2) = \frac{3}{2}$.