

## EXAM 2(267)

**Problem 1.** Find the form of particular solution for the ordinary differential equation

$$x'' + 2x' + x = e^{-t}(1 + 2t).$$

(Do not compute the coefficients of the polynomials!)

**Problem 2.** Solve the initial value problem

$$x'' - 2x + x = e^t, \quad x(0) = 0, x'(0) = 0.$$

**Problem 3.** Find a general solution for the ordinary differential equation

$$x^{(3)} + 2x'' + x' = 0$$

**Problem 4.** Find the general solution for the ordinary differential equation using the method of variation of parameters

$$x'' + 2x' + x = 2\frac{e^{-t}}{t}.$$

**Problem 5.** A mass-spring-dashpot system described by the ordinary differential equation

$$mx'' + cx' + kx = F_0 \cos(\omega t).$$

with  $m = 1$ ,  $c = 2$ ,  $k = 1$ ,  $F_0 = 1$ ,  $\omega = 1$ . Find a particular solution in the form  $x_p(t) = C \cos(\omega t - \alpha)$ .