Unit 2 Lesson 5

· To solve for polynomial input to a second order CC LDE, make an polynomial ansatz of the same degree k as input in the form

$$A_k t^k + A_{k-1} t^{k-1} + \cdots + A_0$$

Unit 2 Lesson 5 Problems

We are asked to find a solution to

$$y'' + 3y' + 4y = 4x^2 - 2x. = \cdots$$

Make the ansatz

$$y_p = Ax^2 + Bx + C$$

$$y'_p = 2Ax + B$$

$$y''_p = 2A; \text{ thus}$$

$$2A + 3(2Ax + B) + 4(Ax^2 + Bx + C) = \cdots$$

$$4Ax̸ = 4x̸$$

$$4Bx̸ + 6Ax̸ = -2x̸ \implies \begin{array}{l} A = 1 \\ B = -2 \\ C = 1 \end{array}$$

$$4C + 3B + 2A = 0 \qquad y_p = x^2 + -2x + 1$$

and then solve the inhomogeneous case

$$y'' + 3y' + 4y = 0$$

$$x̸^2 + 3x̸ + 4 = 0$$

$$r = \frac{-3 \pm \sqrt{9 - 18}}{6} \qquad \text{is a mess}$$