

### An important example

Today we saw an example at the end of the lecture. There was an error in the presentation. Here I would like to correct it.

**Problem** Find a particular solution of

$$y'' + y' + y = 2t^2 + t - 1.$$

**Solution** We set

$$y = A + Bt + Ct^2.$$

(We could also name it  $y_0$  as in the lecture.) Then we have

$$y' = B + 2Ct,$$

$$y'' = 2C.$$

Hence

$$y'' + y' + y = 2C + (B + 2Ct) + (A + Bt + Ct^2) = (2C + B + A) + (2C + B)t + Ct^2 = 2t^2 + t - 1.$$

It follows that

$$C = 2, 2C + B = 1, 2C + B + A = -1.$$

Then we have

$$B = 1 - 2C = -3, A = -1 - 2C - B = -1 - 4 + 3 = -2.$$

Our particular solution is then

$$y = -2 - 3t + 2t^2.$$