Section 4.7:

37. $ty'' - (t+1)y' + y = t^2$

Try: $y_p = v_1 e^t + v_2(t+1)$

where $v_1' e^t + v_2'(t+1) = 0$

and we get $v_1' e^t + v_2' = \frac{t^2}{t} = t$

subtracting these eq'ns $\Rightarrow$ $v_2' t = -t$ or $v_2' = -1$

$\Rightarrow \boxed{v_2 = -t}$

Then $v_1' = +(t+1)e^{-t}$

$v_1 = \int (t+1)e^{-t}\,dt$ $\quad u = t+1, \; dv = e^{-t} \Rightarrow du = dt, \; v = -e^{-t}$

$= -(t+1)e^{-t} + \int e^{-t}\,dt = -(t+1)e^{-t} - e^{-t}$

or $\boxed{v_1 = -te^{-t} - 2e^{-t}}$

so $y_p = (-t-2) + (-t^2 - t) = -t^2 - 2t - 2$

and the gen. sol'n is

$\boxed{y = c_1 e^t + c_2(t+1) - t^2 - 2t - 2}$