

QUESTION

Find a particular integral of the differential equation $\frac{d^2x}{dt^2} + \frac{dx}{dt} + x = t$.

ANSWER

$$\frac{d^2x}{dt^2} + \frac{dx}{dt} + x = t$$

To find a particular integral try $x = Ct + D$, $\frac{dx}{dt} = C$, $\frac{d^2x}{dt^2} = 0$

Substituting this into the ODE gives:

$$0 + C + Ct + D = t \Rightarrow C = 1, \Rightarrow C + D = 0 \Rightarrow D = -1$$

Hence a particular integral is $x = t - 1$