

QUESTION

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

ANSWER

For the particular integral try  $x = At^2 + Bt + C$ ,  $\frac{dx}{dt} = 2At + B$ ,  $\frac{d^2x}{dt^2} = 2A$   
Substituting this into the differential equation gives  $2A + At^2 + Bt + C = t^2$   
 $t^2 : A = 1, \quad t : B = 0, \quad \text{const.} : C = -2A = -2$   
Therefore the particular integral is  $x = t^2 - 2$ .