

1 | Given

$$\begin{aligned} a &= \frac{dv}{dt} & v &= \int a dt \\ v &= \frac{dx}{dt} & x &= \int v dt \end{aligned}$$

2 | Derive the kinematic equations for constant acceleration

$$v = \int a dt = at + C_v$$

$$x = \int v dt = \int (at + C_v) dt = \frac{1}{2}at^2 + C_v t + C_x$$

Letting $x_0 = C_x$ and $v_0 = C_v$,

$$x = x_0 + v_0 t + \frac{1}{2}a_0 t^2$$