1 | Given

\[\begin{matrix} a = \frac{dv}{dt} & v = \int a dt \\ v = \frac{dx}{dt} & x = \int v dt \end{matrix}\]

2 | Derive the kinematic equations for constant acceleration

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

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

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