# Solved selected problems of Lagrangian and Hamiltonian by Mann

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**Solution.** **1.1** Let us integrate the acceleration $2c$ to obtain the velocity $\dot{r}(t)$ as follows

$$\dot{r}(t) = \int 2c \ dt = 2ct + C$$

But at $t = 0$ we know that $\dot{r}(t) = b$ then $C = b$ and hence

$$\dot{r}(t) = 2ct + b$$

Now, we integrate again to obtain the position $r(t)$ as follows

$$r(t) = \int 2ct + b \ dt = ct^2 + bt + C$$

But at $t = 0$ we know that $r(t) = a$ then $C = a$ and hence

$$r(t) = ct^2 + bt + a$$

□